S
622.361
L3bd
1977

PLEASE RETURN

STATE DOCUMENTS COLLECTION
1978
MONTANA STATE LIBRARY
930 E Lyndale Ave.
Helena, Montana 59601

STATE OF MONTANA
DEPARTMENT OF STATE LANDS

MAILING ADDRESS: CAPITOL STATION
OFFICE: 1625 11TH AVENUE
HELENA 59601
(406) 449-2074

STATE BOARD OF LAND COMMISSIONERS
THOMAS L. JUDGE
GOVERNOR
GEORGIA RICE
SUPT. OF PUBLIC INSTRUCTION
FRANK MURRAY
SECRETARY OF STATE
MIKE GREELY
ATTORNEY GENERAL
E. V. "SONNY" OMHOLT
AUDITOR

LEO BERRY, JR
COMMISSIONER

SCHOOL LANDS

MINING

RECLAMATION

August 11, 1977

Attached is a draft Environmental Impact Statement (EIS) for a proposed bentonite mine and drying plant near the town of Glasgow, Valley County, Montana. On June 23, 1977, Federal Bentonite Co., a division of Aurora Metal Co. of Aurora, Illinois, applied to the Department of State Lands for an Open Cut Mine Contract on 295.9 acres. Such acreage would be utilized for bentonite pits, haul roads, and associated disturbance.

Bentonite is a montmorillnite (2:1) clay and is generally mined in a hop-scotch pattern with a relatively large number of pits being open at any one time. Bentonite pits are small, 3 to 10 acres in size and as a rule are not over 50 feet deep. The bentonite mined by Federal Bentonite Co. near Glasgow would generally be used for drilling mud, for foundry uses, and as a sealant. The Department of State Lands administers the Open Cut Mining Act pursuant to Title 50, Chapter 15, R.C.M. 1947.

This EIS is being distributed for public and agency review in compliance with Section 69-6504(b)(3) of the Montana Environmental Policy Act. Normally 30 days would be allowed for receipt of public comments; however, because of the tight decision-making time frames of the Open Cut Mining Act, comments must be submitted to the Department of State Lands no later than Tuesday, August 23, 1977. The Open Cut Mining Act allows only 60 days for the departmental decision making once a complete contract application has been received; Federal Bentonite's application was complete on June 29, 1977. All comments should be submitted to the Environmental Administrator, Department of State Lands, Capitol Station, Helena, Montana 59601.

Contract application materials submitted by the Federal Bentonite Co. are on file and available for public review in the Department's Helena office.

This draft EIS was prepared jointly with the Montana Department of Health and Environmental Sciences. An accompanying cover letter explains that agency's statutory obligations.

Sincerely,

Brace Hayden

Brace Hayden
Environmental Administrator

Attachment

DATE DUE
MSL MAR 1 '78

Montana State Library
3 0864 1006 6152 2

Department of Health and Environmental Sciences
STATE OF MONTANA HELENA, MONTANA 59601
A. C. Knight, M.D.
XXXXXXXXXXX
DIRECTOR

August 11, 1977

Reviewer:

This cooperative draft environmental impact statement (EIS) is submitted for your review and consideration. Comments and questions concerning air quality aspects of the EIS will be accepted for 30 days after the date of this publication. If no communication occurs during the prescribed time, it will be assumed the person or agency does not have any comments. An extension of time, not to exceed 15 days, may be requested. All comments should be sent to the Air Quality Bureau, Environmental Sciences Division, Cogswell Building, Helena, Montana, 59601.

Sincerely,

Thos M. Ellerhoff

Thomas M. Ellerhoff
Acting Division Administrator

TME:dmg

NOTE: If you wish to examine the draft EIS for the Federal Bentonite Company, a copy will be furnished upon request. Please contact Fred Gray, Air Quality Bureau, 449-3454.

DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR A
PROPOSED BENTONITE MINE AND DRYING PLANT
FEDERAL BENTONITE COMPANY
VALLEY COUNTY, MONTANA

Prepared by
Montana Department of State Lands
and the
Montana Department of Health and Environmental Sciences
Helena, Montana
August 11, 1977

Circulated pursuant to
Montana Environmental Policy Act
Section 69-6504(b)(3)

TABLE OF CONTENTS

Page

I. INTRODUCTION 1

- A. The proposed actions and departmental responsibilities 1
  - 1. Department of State Lands 1
  - 2. Department of Health & Environmental Sciences. . . 4
- B. Mining plan 6
- C. Drying plant configuration 9
- D. Properties and uses of bentonite 11
- E. Bentonite mining in the Glasgow area 12

II. DESCRIPTION OF THE EXISTING ENVIRONMENT 14

- A. Physical environment 14
  - 1. Topography 14
  - 2. Climate 14
  - 3. Air quality 14
  - 4. Geology 15
  - 5. Soils and overburden 19
  - 6. Water quality, quantity and distribution 23
- B. Biological environment 24
  - 1. Vegetation 24
    - a. Claims area 24
    - b. Contract area and plant site 27
  - 2. Wildlife 30
    - a. Claims area 30
    - b. Contract area and plant site 33
- C. Human environment 34
  - 1. Demographics 34
  - 2. Land use 34
  - 3. Local economy 34
  - 4. Social structure 35
  - 5. Social services 35
  - 6. Archaeological and historical sites 35
  - 7. Transportation 36
  - 8. Taxes 37
  - 9. Agricultural production 37

III. ENVIRONMENTAL IMPACTS OF THE PROPOSALS 38

- A. Physical environment 38
  - 1. Topography 38
  - 2. Climate 38
  - 3. Air quality 38
  - 4. Geology 41
  - 5. Soils and overburden 41
  - 6. Hydrology 41
- B. Biological environment 42
  - 1. Vegetation 42
  - 2. Wildlife 43

Page

a. Contract area and plant site 43
b. Claims area 44
C. Human Environment 45
1. Demographics 45
2. Land use 45
3. Economics 46
4. Social structure 46
5. Social services. 46
6. Transportation 46
7. Archaeological and historical sites 46
8. Aesthetics 47
9. Taxes 47
10. Agricultural production 47
11. Human health 47

IV. MITIGATING OR COMPENSATING MEASURES 49

A. Physical environment 49
1. Topography 49
2. Air quality 49
3. Soils and overburden 50
4. Hydrology 52
B. Biological environment 53
1. Vegetation 53
2. Wildlife 54
C. Human environment 54
1. Historical and archaeological sites 54
2. Aesthetics 55
3. Agricultural production 55

V. COMPARISON BETWEEN SHORT-TERM COSTS AND LONG-TERM PRODUCTIVITY 56

VI. IRREVERSIBLE, IRRETRIEVABLE COMMITTMENTS OF ENVIRONMENTAL RESOURCES 57
A. Mineral 57
B. Energy consumption 57
C. Surface productivity 57
D. Archaeological and historical sites 58
E. Aesthetics 58

VII. ALTERNATIVES TO THE PROPOSED ACTIONS 59

A. Montana Department of State Lands 59
1. Denial of contract 59
2. Change of mining and/or reclamation plan 59
3. Change method of mining 59
B. Montana Dept. of Health & Environmental Sciences . . . 59
1. Denial of construction permit 59
2. Conditional approval of construction permit . . . 60
3. Unconditional approval of construction permit. . . 60

VIII. SOURCE MATERIAL USED IN PREPARATION OF DRAFT ENVIRONMENTAL IMPACT STATEMENT 61

A. References cited 61

Page

B. Contributors 62
C. Other agencies contacted 63

APPENDICES

A. Correspondence regarding validity of mining claims located for bentonite in Montana.

B. Legal description and acreage of Federal Bentonite's proposed contract area.

C. Example mining sequence for bentonite pits.

D. Listing of uses for bentonite.

LIST OF TABLES

TABLE NUMBER | PAGE

1. Total suspended particulate levels for five stations within 100 miles of Glasgow, Montana 15
2. State of Montana ambient air quality standards 16-17
3. Federal primary and secondary air quality standards 18
4. Range site classification, range condition, and stocking rate for twenty-two transects run on the Federal Bentonite study area 26
5. Acreages of vegetation types in each of Federal Bentonite's five proposed mining areas 29
6. Estimated emission rates for proposed mine and plant sources. 40
7. Revegetation species for Federal Bentonite's proposed contract area 54

LIST OF FIGURES

PAGE

1. Federal Bentonite claims area -- The Brazil Creek and Little Beaver Creek drainages in the Montana Sector of the Northwestern plains region 2
2. Federal Bentonite's proposed contract area within their bentonite claims southwest of Glasgow, Montana . . . 3
3. Federal Bentonite's proposed mining and reclamation plan for contract area in Claim 25 8
4. Layout design of Federal Bentonite's proposed drying plant southwest of Glasgow, Montana 10
5. Soils map of Federal Bentonite's proposed contract area in Claim 25 20
6. Vegetation map of Federal Bentonite's proposed contract area in Claim 25 28

I. Introduction

A. The proposed actions and departmental responsibilities

1. Department of State Lands

The Department of State Lands (DSL) administers the Montana Open Cut Mining Act (Chapter 15, Title 50, R.C.M. 1947). The Open Cut Mining Act specifies that:

> After March 16, 1973, no operator may conduct opencut mining operations which will result in the removal of 10,000 cubic yards, or more, of product or overburden, until he has entered into a contract with the board for the reclamation of the land affected. An operator conducting a number of operations, each of which result in the removal of less than 10,000 cubic yards of product or overburden but which result in the removal of 10,000 cubic yards, or more, of product or overburden in the aggregate, is subject to the provisions of this act.[a]

An Open Cut Mining Contract requires operators to provide for the reclamation of mined land. A bond of $200 to $1000 per acre must be filed with DSL. A contract may be enforced through forfeiture of bond or criminal penalties. DSL has implemented rules pursuant to the Open Cut Mining Act (MAC 26-2.10 (6)510110).

On June 23, 1977, Federal Bentonite Company, a division of Aurora Metal Company, applied to DSL to contract 295.9 acres of land in Valley County, Montana, for bentonite mining and associated disturbance.

Federal's proposed bentonite pits are located approximately 20 miles west southwest of Glasgow, Montana (Figure 1). Federal holds mining claims in Townships 27 and 28 North (MPM) which total 20,200 acres (Figure 2). Originally, Federal had applied for a contract on all of these claims, however because the company was unable to meet all the requirements of the Act and rules on such a large area, it submitted a new contract application on a smaller area within its claims area.

---

[a] product is defined in the Act as bentonite, clay, scoria, phosphate rock, sand, or gravel.

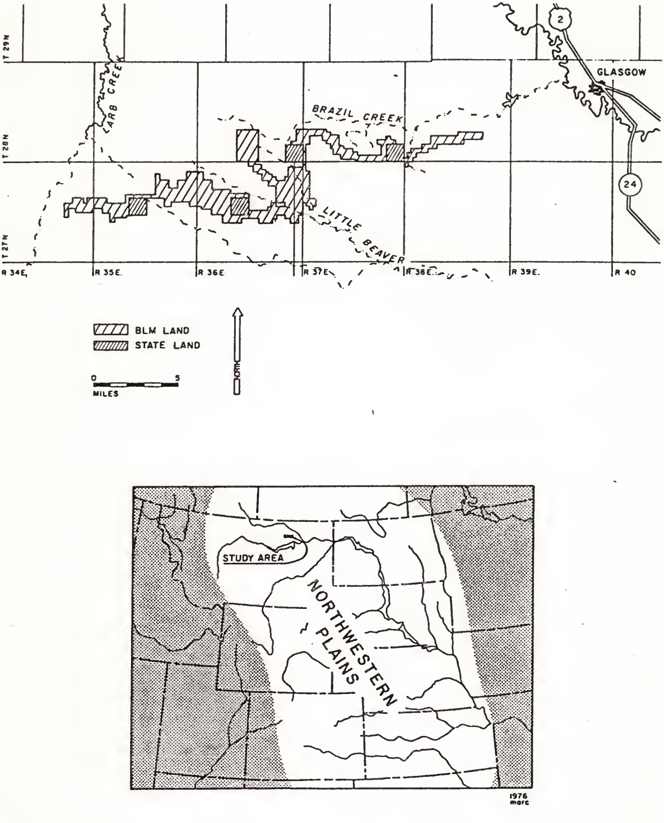


Figure 1. -- Federal Bentonite claims area -- The Brazil Creek and Little Beaver Creek drainages in the Montana Sector of the Northwestern Plains Region.

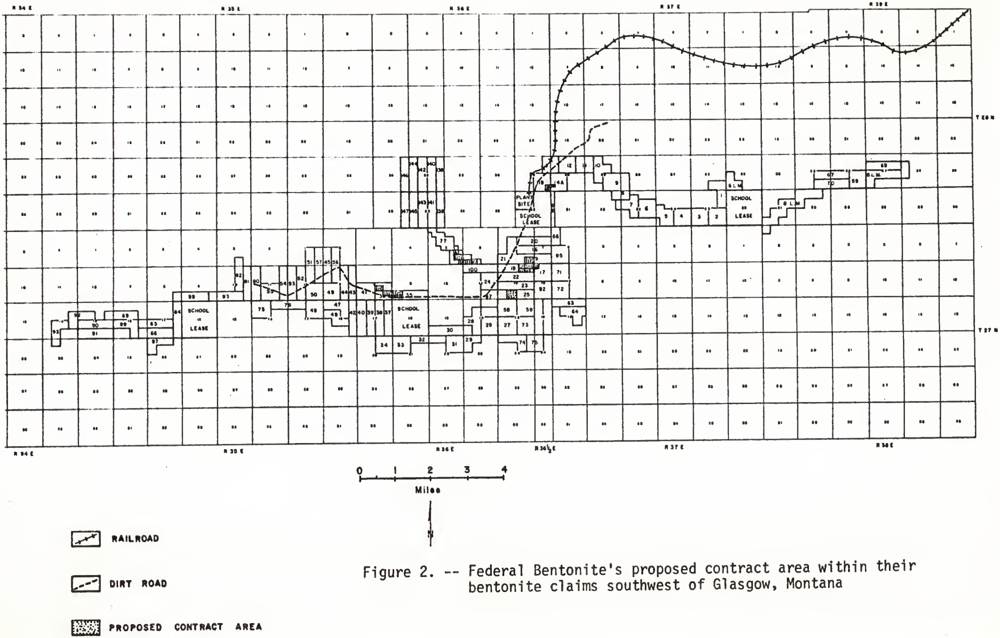


Figure 2. -- Federal Bentonite's proposed contract area within their bentonite claims southwest of Glasgow, Montana

The Montana Environmental Policy Act (MEPA) requires that Environmental Impact Statements (EIS) be prepared on proposals for projects, programs, legislation, and other major actions of state government significantly affecting the quality of the human environment (Section 69-6504, R.C.M. 1947). Pursuant to MEPA, the DSL determined that contracting Federal Bentonite's proposed bentonite operations in Valley County was major and significant and hence requires that a draft EIS be prepared on the proposed action. DSL has adopted rules pursuant to MEPA (MAC 26-2.2(18)-P250).

2. Department of Health and Environmental Sciences Responsibilities

Under the Clean Air Act of Montana (Chapter 39, Title 69, R.C.M. 1947), the Department of Health and Environmental Sciences (DHES) is responsible for assuring the prevention, abatement and control of air pollution in Montana. The Clean Air Act provides that the Board of Health and Environmental Sciences may prohibit:

> "...the construction, installation, alteration, or use of any machine, equipment, device or facility which it finds may directly or indirectly cause or contribute to air pollution or which is intended primarily to prevent or control the emission of air polluntants, unless a permit therefore has been obtained from it."

On April 4, 1977, Federal Bentonite Co. submitted a construction permit application to DHES for a bentonite drying plant to be located near the 5 proposed contract areas (Figure 2). The application was required by rule MAC 16-2.14(1)-S1400, Permits, Construction and Operation of Equipment, adopted pursuant to the Clean Air Act of Montana. Other rules adopted under the authority of the Clean Air Act of Montana which apply to the mining and drying plant operations are: 1. MAC 16-2.14(1)-S1430, Particulate Matters, Industrial Processes. 2. MAC 16-2.14(1)-S1440, Particulate Matters, Airborne. 3.MAC 16-2.14(1)-S1450, Particulate Matters, Fuel Burning Equipment. 4. MAC 16-2.14(1)-S1460, Visible Air

Contaminants, Restrictions. 5. MAC 16-2.14(1)-S1470, Sulfur Oxide Emissions. 6. MAC 16-2.14 (1)-S14000, Malfunction of an Installation. 7. MAC 16-2.14(1)-S14010, Circumvention. 8. MAC 16-2.14(1)-S14040, Ambient Air Quality Standards. 9. MAC 16-2.14(1)-S14050, Testing Required; Facilities.

Pursuant to its MEPA rules DHES prepared a Preliminary Environmental Review for Federal's drying plant proposal and associated mining operation. The review indicated that the proposal was a major and significant action of state government significantly affecting the quality of the human environment and that a draft EIS should be prepared for the proposal.

Because both DSL and DHES must prepare a draft environmental impact statement (EIS) on Federal's mining and facility proposals respectively, a joint statement is advantageous from both an efficiency and public information standpoint. Staff expertise from the two agencies was utilized in preparing this draft EIS with DHES concentrating their efforts on the air and water quality sections and DSL concentrating theirs on the biological and socioeconomic sections. In addition, an environmental impact report prepared by Econ Inc. for Federal Bentonite Co.[1] provided considerable material for the draft EIS as did an earlier draft EIS prepared by DSL on another bentonite proposal.[2]

This draft EIS specifically covers Federal's proposed contract area and drying facility site. Data on Federal's entire claims area however is also presented. Should Federal at some point in the future apply for an open cut contract on more of their claims area, it is anticipated that only an addendum to this draft EIS would be necessary. Such an addendum however, would require the collection of additional data on Federal's claims area.

[illegible]

[illegible]

[illegible]

B. Mining plan

Federal Bentonite Company holds mining claims in Valley county which comprise 17,640 acres of BLM land, 2,400 acres of state land and 160 acres of private land. Both the surface and mineral estate for the proposed 295.9 acre contract area itself belongs to the BLM. The Federal Bentonite Company has applied for patent on their claims, however, the BLM is currently investigating the validity of mining claims located for bentonite in Montana (see Appendix A). A BLM conducted field examination of the nature of the bentonite on Federal's claims in the Glasgow area will begin on August 15, 1977.

Federal's mining and reclamation plan for the contract area includes: 180 acres for mining and associated disturbance, 102.5 acres of old Hallett-Mineral test pits for which Federal is assuming reclamation responsibility, and 13.4 acres of haul and access roads (see Appendix B).[3] Federal estimates that the proposed contract area will suffice for approximately 1½ years of mining. The company expects to mine approximately 2000 acres in the next five years. The projected mine life, should all of Federal's Glasgow area claims be mined, is 20 or more years.

Federal's proposed contract area is composed of 5 separate units and comprises 9 seperate claims (see Figure 2). Two of the contract area units have been partially mined by Hallett minerals; the other three are unmined.

Federal's basic mining plan for mining a deposit of bentonite includes the following procedures: The deposit is defined and a mining plan developed to minimize interference with natural drainage and to allow the final cut to drain with a minimum of backfilling. Overburden from each succeeding pit will be used to backfill the previous pit. Unless approved for another use site, each final pit will be backfilled

1. Introduction

[illegible]

[illegible]

[illegible]

[illegible]

to the degree necessary to maintain natural drainage and eliminate boggy conditions. The topsoil is removed and replaced by scrapers in the following sequence: (see diagram, Appendix C)

(1) The top six inches of topsoil is removed and stockpiled.

(2) The remaining viable subsoil is then removed and stockpiled.

(3) The overburden is removed and piled and the bentonite is removed.

(4) The top six inches of topsoil from the next pit is removed and stockpiled.

(5) The remaining viable subsoil from the next pit area is removed and spread on the first overburden area.

(6) The overburden is removed and placed in the first pit area and the bentonite from the second pit is removed.

(7) The top six inches of topsoil from the third pit area is then spread on previously spread subsoil on the first overburden area and the subsoil is spread on the first pit area.

(8) This sequence continues throughout the area to be mined until the last pit is mined, at which time the subsoil and then the topsoil are spread on the last cut.

No soil will be saved from barren areas of bentonite or rock outcrops. These areas will be graded to maintain their current watershed capabilities.

Where soils materials are salvaged from a new disturbance, they will be either redistributed or stockpiled for future use. As limited quantities of soils materials are available, such materials will be preferentially redistributed on slopes of 3:1 or less. If a stockpile is left more than one year and natural vegetation does not take place, a temporary cover of grasses will be seeded.

DSL has determined that because of the limited topsoil available on Federal's proposed contract areas that the company should not retopsoil those areas which represent in the premining state barren areas of bentonite. Soils stockpiles will be safeguarded from loss due to wind or water erosion or machinery activity.

A map of the proposed mining and reclamation plan for one of the five contract area units (claim 25) is shown on Figure 3 as an example to the reader.

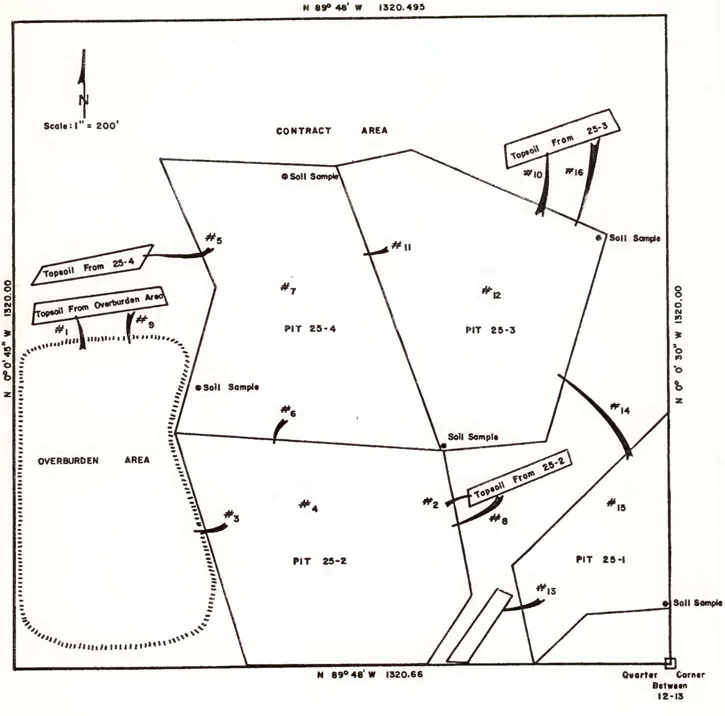


Figure 3. -- Federal Bentonite's proposed mining and reclamation plan for contract area in claim 25

C. Drying plant configuration

Federal owns a 160 acre block of land in T.28N., R.36E. on which they proposed to locate their drying facility (Figure 2). This facility is located at the end of the existing rail spur that extends from the Burlington Northern (BN) mainline near Glasgow to the claim area. The drying facility would reduce the bentonite moisture content from approximately 30 percent to 10-14 percent prior to rail shipment. The company proposes to move by rail an 8 x 80 rotary kiln dryer to the proposed plant site.[a]

Eventually, Federal plans to convert their drying operation from fuel oil to coal. Coal for the drying operation would most probably be from either the Sidney or Roundup areas of Montana.

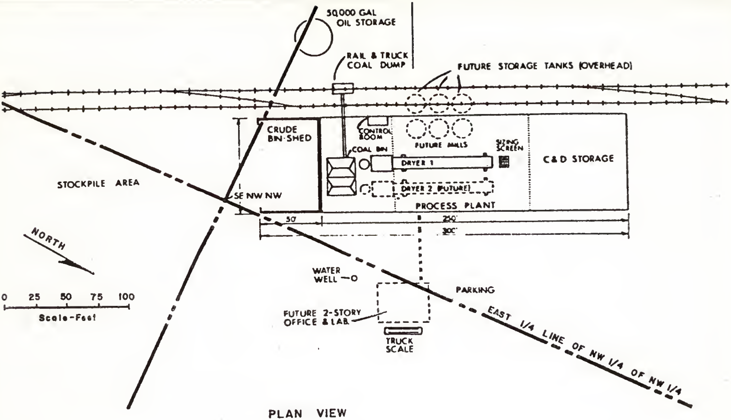
Federal's proposed bentonite drying plant would be constructed in three phases.[4] A layout of the plant area is shown in Figure 4. Federal's air quality construction permit application to DHES covers only the initial plant configuration.

The initial plant configuration would consist of a crude bentonite shed, a roll crusher, one oil or coal-fired rotary dryer (8' in diameter by 80' long), one set of vibrating screens, a radial stacker system, a crushed and dried bentonite storage shed, a 50,000 gallon oil storage tank and supply system, a coal handling and pulverizing system, a truck scale, and possibly a water well. A trailer or trailers would be moved into the area to provide temporary office and laboratory space. Eventually, a two-story office and laboratory building would be built.

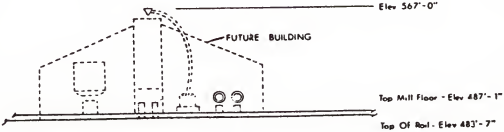
Phase II of the construction schedule would include enclosing the area between the two sheds which will cover the coal bins, pulverizers, two rotary dryers, sizing screens, the radial stacker and the bucket

---

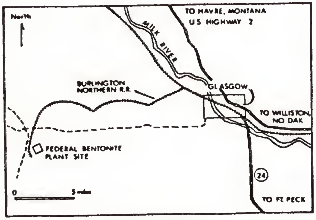
[a] The kiln dryer was formerly owned and operated by Hallett Minerals at a plant site near Vananda, Montana.



PLAN VIEW



CROSS SECTION



LOCATION MAP

Figure 4. -- Layout design of Federal Bentonite's proposed drying plant southwest of Glasgow, Montana

elevators. Also included in this phase would be the installation of as many as three ball mills for reducing the particle size of the crushed bentonite material. Associated with the ball mills would be product storage tanks mounted over the railroad spur line. An electrostatic precipitator, or baghouse, would be installed during Phase II to control all of the particulate emission points in the plant. Gases from the dryers, screens, mills, the building, the bucket elevators, and possibly the mills, would be routed to the control unit. Installation of the ball mills is dependent on future sales increases and therefore the size of the electrostatic precipitator or baghouse would be dependent on whether or not these mills are installed. An installation date for a baghouse or electrostatic precipitator would be included in the construction permit in keeping with the state's requirement for the installation of best available control technology.

Phase III of the plant construction would include the addition of a warehouse and bag packer across the railroad spur from the drying building. This expansion is also dependent on future bentonite sales.

D. Properties and uses of bentonite

Bentonite is a Montmorillnite (2:1) clay. There are two types of commercial bentonite: calcium or nonswelling bentonite and sodium or swelling or Wyoming bentonite. Calcium or nonswelling bentonite describes a bentonite in which the cation exchange sites of the clay particles are dominated by calcium. Wyoming (sodium or swelling) bentonite is that in which the exchange sites are dominated by sodium. Sodium has a strong affinity for water; by drawing water into the clay lattice, the bentonite achieves its swelling properties. Wyoming bentonite can absorb up to 15 times its volume of water, resulting in a volume 15 times the original. Ninety to ninety-five percent of the world's commercially mineable

deposits of Wyoming bentonite occur in South Dakota, Wyoming, and Montana. Bentonite mined in the Glasgow area is Wyoming Bentonite.

Over 1,000 uses have been identified for bentonite (see Appendix D) ranging from well drilling mud to a clarifier for wine.[5] Major uses for Wyoming Bentonite and for the bentonite mined within the proposed contract area include drilling mud, foundry uses and as a sealant. Each use of bentonite has a different set of quality specifications, with the highest quality generally required for oil well drilling mud. Generally, the grade varies with the beds and, to some extent, with the location within the bed. Accordingly, a general mining procedure is to drill a contract area prior to mining to determine the extent, depth, and grade of a bed.

DSL has noted that:[2]

> A bentonite mining company usually has contracts to supply bentonite for various uses, requiring different grades. Thus, the company must have on hand all of these grades at one time. This requires the opening of different pits at different locations on a bed and possibly on different beds. The result is a hopscotch type mining with a relatively large number of pits being open at any one time.
>
> The depth to which a company will mine bentonite depends on the grade and the thickness of the bed. A rule of thumb is that the stripping ratio will not exceed 10:1. That is, 10 feet of overburden will be removed for each foot of bentonite in the bed. The result is that normally pits are not over 50 feet deep. As a rule, pits are small (3 to 10 acres) in size. Where possible, pits are opened in sequence along a bed in a cut and fill type of operation. Variations in bed thickness and overburden depth result in pits or pit clusters often being placed rather haphazardly on a claim. Actual disturbance within a claim area is often quite small, with pits being located where the bed is thick enough or shallow enough to be economical to mine.

E. Bentonite mining history in the Glasgow area

Bentonite related activity in the claim area is somewhat recent. Core drilling, road building, and surveying valued at $11,300 was conducted on 99 claims in the tract by the Brazil Creek Bentonite Company. Federal Bentonite acquired the leases from the Brazil Creek Bentonite Company

and drilled approximately 90 test holes in 1965. Nine experimental pits were mined in 1966 and 1967 by local contractors. Extensive drilling for assessment and proving out tonnages occurred between January 1966 and August 1976. Other developments associated with the bentonite mining include: the construction of a road to the plant site and 15 miles west beyond it in 1967, 1968, and 1969; soil sampling at the plant site in 1967; installation of a telephone line in 1968; and the construction of a railroad spur to the plant site in 1969 and 1970.[1]

II. Description of the Existing Environment

A. Physical environment

1. Topography

Topography in the vicinity of Federal Bentonite's proposed contract and plant site area consists of rolling hills and ridges interrupted by flat-bottomed drainages. The two principal drainages near the area include Little Beaver Creek and Brazil Creek, both of which are intermittent (Figure 1). The approximate elevation of the contract and plant site area is 2500 feet.[1]

2. Climate

The Glasgow area has an essentially continental type climate with warm summers, cold winters, wet springs, and relatively light winter precipitation. July and August normal daily maximum temperatures are 84.3 degrees F. and 83.0 degrees F., respectively. January's normal daily minimum temperature is -0.5 degrees F. The normal precipitation amounts for the months of April through August total 7.68 inches, or 71 percent of the yearly normal precipitation of 10.87 inches. The normal precipitation amounts for the months of November through March total 1.78 inches, or 16 percent of the yearly normal precipitation. Temperature extremes, usually of short duration, are common, with 1971 seeing a maximum of 106 degrees F. in August and a minumum of -32 degrees F. in February. The normal growing season for the area is 124 days (May 19 to September 20).[1]

3. Air quality

Air quality data for the Glasgow area is sparse. Total suspended particulate matter, which will be the primary pollutant emitted by both the mining and bentonite drying operations, has been measured at five stations within approximately 100 miles of Glasgow. The data from these five locations are summarized in Table 1. Comparison of this data

with the state and federal air quality standards presented in Tables 2 and 3 shows the concentrations of total suspended particulate matter are well below the standards. It is likely that ambient air particulate concentrations in the proposed bentonite drying plant area will be about the same as the lower values in Table 1.

Table 1 -- Total suspended particulate levels for five stations within 100 miles of Glasgow, Montana

(Mg/m^3 annual geometric mean)

Station	Year (year to date) 1975	1976	1977
Scobey, Daniels County	7.4	27.8	31.7**
Lindsay, Dawson County	11.6*	13.0	13.5**
Lindsay, Dawson County	12.3*	14.5	11.2**
Poplar, Roosevelt County	12.7	24.9	
Fort Peck, McCone County	15.4	21.1	23.2**

*Through November, 1975
**Through April, 1977

Concentrations of sulfur dioxide, gaseous flourides and reactive sulfur compounds have been measured at Colstrip, Montana, but it is not felt the data would be indicative of concentrations in the Glasgow area. No ambient air quality data exists for the Glasgow area for the pollutants for which ambient air quality standards have been established except for sulfur oxides and nitrogen oxides. These two pollutants have been measured by the bubbler technique at the Ft. Peck station. Concentrations of both are essentially zero. It seems reasonable however, that concentrations of the unmeasured polluntants in the ambient air near the proposed plant and mine site are extremely low.

4. Geology

Bentonite deposits are widespread throughout Valley County and are found at many levels within the Bearpaw Shale formation. The Bearpaw Shale, a late Cretaceous formation approximately 1140 feet thick, is

Table 2. -- State of Montana ambient air quality standards[a]

Pollutants	Standards (Maximum permissible concentrations)
Sulfur dioxide	0.02 ppm, maximum annual average 0.10 ppm, 24-hour average, not to be exceeded over 1 percent of the days in any 3-month period 0.25 ppm not to be exceeded for more than 1 hour in any 4 consecutive days
Reactive sulfur (sulfation)	0.25 milligrams sulfur trioxide per 100 square centimeters per day, maximum annual average 0.50 milligram sulfur trioxide per 100 square centimeters per day, maximum for any 1-month period
Suspended sulfate	4 micrograms per cubic meter of air, maximum allowable annual average 12 micrograms per cubic meter of air, not to be exceeded over 1 percent of the time
Sulfuric acid mist	4 micrograms per cubic meter of air, maximum allowable annual average 12 micrograms per cubic meter of air, not to be exceeded over 1 percent of the time 30 micrograms per cubic meter of air, hourly average, not to be exceeded over 1 percent of the time
Hydrogen sulfide	0.03 ppm, 1/2-hour average, not to be exceeded more than twice in any 5 consecutive days 0.05 ppm, 1/2-hour average, not to be exceeded over twice a year

---

[a] From The Bureau of National Affairs, 1975

Table 2. -- State of Montana ambient air quality standards (cont.)

Pollutants	Standards (Maximum permissible concentrations
Total suspended particulate	75 micrograms per cubic meter of air, annual geometric mean 200 micrograms per cubic meter of air, not to be exceeded more than 1 percent of days a year
Settleable particulate (dustfall)	15 tons per square mile per month, 3-month average in residential areas 30 tons per square mile per month, 3-month average in heavy industrial areas
Lead	5.0 micrograms per cubic meter of air, 30-day average
Beryllium	0.01 micrograms per cubic meter of air, 30-day average
Fluorides, total (as HF) in air	1 part per billion parts of air, 24-hour average
Fluorides (as F) in forage for animal consumption - dry weight basis	35 parts per million
Fluorides (gaseous)	0.3 micrograms per square centimeter per 28 days

Table 3. -- Federal primary and secondary air quality standards[a]

Pollutant	Averaging Time	Federal Primary Standard	Federal Secondary Standard
Nitrogen Dioxide[b]	Annual Average	0.05 ppm[c] (100 $\mu g/m^3$)[d]	0.05 ppm (100 $\mu g/m^3$)
Sulfur Dioxide	Annual Average	0.03 ppm (80 $\mu g/m^3$)	-
	24 Hour	0.14 ppm (365 $\mu g/m^3$)	-
	3 Hour	-	0.5 ppm (1300 $\mu g/m^3$)
Suspended Particulate	Annual Geometric Mean	75 $\mu g/m^3$	60 $\mu g/m^3$
	24 Hour	260 $\mu g/m^3$	150 $\mu g/m^3$
Hydrocarbons (corrected for methane)	3 Hour 6:00-9:00 a.m.	0.24 ppm[e] (160 $\mu g/m^3$)	0.24 ppm (160 $\mu g/m^3$)
Photochemical Oxidants	1 Hour	0.08 ppm (160 $\mu g/m^3$)	0.08 ppm (160 $\mu g/m^3$)
Carbon Monoxide	8 Hour	9 ppm (10 mg/m^3)[f]	9 ppm (10 mg/m^3)
	1 Hour	35 ppm (40 mg/m^3)	35 ppm (40 mg/m^3)

All standards except annual average are not to be exceeded more than once a year.

---

[a] From the Bureau of National Affairs, 1975.

[b] Nitrogen dioxide is the only one of the nitrogen oxides considered in the ambient standards.

[c] ppm = parts per million

[d] $\mu g/m^3$ = micrograms per cubic meter

[e] Maximum 3-hour concentration between 6:00 - 9:00 a.m.

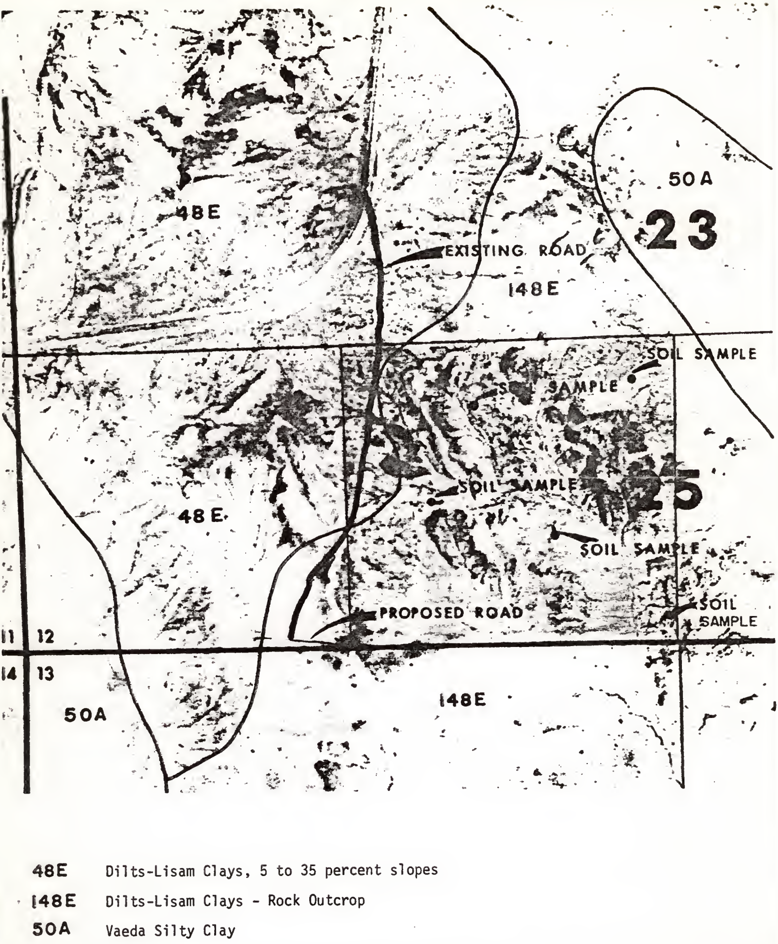
[f] mg/m^3 = milligrams per cubic meter

the dominant sedimentary unit of the area, surficially present over most of the county and underlying the rest of it. The Bearpaw Shale was deposited under marine conditions and has abundant marine fossils and widespread gypsum deposits. Volcanic ash accumulated in the Bearpaw Shale near the end of the Cretaceous Period, and the shale was altered to produce bentonite deposits in strata as thick as 2 meters. [1]

The proposed Federal Bentonite contract area would operate in bentonite units of the Bearpaw Shale formation.

5. Soils and overburden

The soils in Federal Bentonite's claim area were mapped by SCS personnel as part of a countrywide soil survey. Additional information about area soils and overburden was gathered by Montana Testing Laboratories, Inc. (MTL) in accordance with DSL guidelines. [6] The area soils are composed of 11 mapping units: Elloam clay loam, 1 to 5 percent slope (525.2 acres, 2.6%); Dilts-Lisam, 5 to 35 percent slopes (11,714 acres, 58%) Vaeda silty clay, 0 to 3 percent slope (2929 acres, 14.5%); Rock Otucrop shale, 9 to 45 percent slopes (444.4 acres, 2.2%); Elloam gravelly clay, 2 to 9 percent slopes (383.8 acres, 1.9%); Dilts-Lisam clays - Rock Otucrop complex, 9 to 35 percent slopes (2060.4 acres, 10.2%); Thebo-Lisam clays, 2 to 5 percent slopes (484.8 acres, 2.4%); Sunburst-Dilts complex, 9 to 35 percent slopes (525.2 acres, 2.6%); Nobe clay, 0 to 4 percent slopes (1050.4 acres, 5.2%); Phillips-Elloam complex, 1 to 9 percent slopes (22.9 acres, 0.1%). The soils series included Absher, Dilts, Elloam, Lisam, Nobe, Phillips, Sunburst, Thebo, and Vaeda. Profile descriptions and soils maps are included in Federal Bentonite's application for an Open Cut Mine contract. A map of the proposed contract area in claim 25 is presented as an example for the reader (see Figure 5).



48E	Dilts-Lisam Clays, 5 to 35 percent slopes
148E	Dilts-Lisam Clays - Rock Outcrop
50A	Vaeda Silty Clay

Figure 5. - Soils map of Federal Bentonite's proposed contract area in claim 25 (Section 12, T27N, R36E).

In general, the soils are developed from glacial till deposits on the upper terraces and clay shale on the lower eroded areas. Dilts clay and Lisam clay dominate the area (12,827 acres, or 63.5% of the total claims area). All of the soils have slow to very slow permeability, limiting water movement and aeration and resulting in medium to rapid surface water runoff and creating a moderate to severe water erosion hazard. All the soils are listed as suitable only for range except 565 acres (2.8%) of Elloam, Phillips, and Thebo series that are suitable for dryland crops. All of the soils have a textural designation of clay for surface and subsurface layers except the top few (2-5) inches of the Absher, Elloam, Nobe, and Phillips series. Soil reaction varies widely and the area is about equally split between acid and alkaline soils.

Profiles of all the major soil types were sampled and analyzed by MTL[6] and the results were included in Federal's application for an Open Cut Mine contract. Such analyses show the soils to be generally strongly saline (EC greater than 10 mmhos) and moderately sodic (SAR greater than 10), although both of these conditions occur much less frequently in the top six inches of soil. Sodic conditions were prevalent in all but the Sunburst series (above 30 inches) and the Lisam and Dilts series. Saline conditions were prevalent in all except a few of the Lisam and Dilts series, the Sunburst series (above 30 inches), and the top six inches of the Elloam series. Water-soluble boron contents were all below DSL's current red flag level of 8 ppm. Quantitative analysis of particle size distribution confirmed the exceedingly fine-textured nature of the soils.

In summary, soils on the contract and claims areas are weakly developed, have thin "A" horizons, are quite saline and often sodic below six inches, and have clay textures. They thus provide a stressful

substratum for the rooting of plants and for general biological activity and are highly susceptible to erosion from surface water runoff.[2]

Due to the hetrogeneous nature of the area, variability between soil test holes was too great to permit any general classification of soil reclamation suitability by soil type. As a result, DSL requested additional soils testing for each proposed pit in the contract area. MTL drilled 20 test holes in the proposed pit areas and again the variability from hole to hole was too great to permit any general classification of soil reclamation suitability by soil type alone. There was, however, a very strong correlation between vegetation present on the surface and soil reclamation suitability. Sites with no vegetation present have no soil suitable to salvage. Sites with sparse vegetation of western wheatgrass, dwarfed big sage, and/or gardner saltbush have up to two feet of suitable soil. Sites with little bluestem, sweet peas, wild rose, prairie sand reed, and/or big sage have up to five feet of suitable soil. Results of this additional testing were included as a supplemental exhibit in Federal Bentonite Company's application for an Open Cut Mine contract.[7]

Two overburden samples were collected and analyzed for each of the major soil types by MTL. Samples were collected to the parting bentonite layer or to hard shale. Results of MTL's overburden study may be found in Federal Bentonite's application for an Open Cut Mine contract.

In general, the overburden in the proposed mine areas is dominated by its clay texture, high salinity, and sodic properties. Occasionally nickel and manganese exceed the level that is expected to restrict normal plant growth and production. Problem concentrations of other trace metals were not evident.

Nitrates are found throughout the profiles and could accumulate at lower depths. However, because of the high SAR and clay texture, it is unlikely that nitrates will leach below the mined layers and enter the ground water system. The exchangeable ammonium concentration varies with each sample and tends to increase below five feet. The high concentrations of exchangeable ammonium occur in layers where the soluble salts, texture, and SAR values are unfavorable as well. [1]

6. Water quality, quantity, and distribution

There are no free flowing streams in the proposed contract area. Tributaries of Brazil and Little Beaver Creeks (Figure 1) occasionally carry water during periods of snow melt and intense rain. The major drainages in the contract area are classified as intermittent.

Groundwater in the proposed contract area is influenced by the Bearpaw Shale formation, which is able to store but not transmit water, and the bentonite beds, which neither transmit nor store water.

Since groundwater is inhibited from transfer in the Bearpaw Shale formation, stock ponds and reservoirs in the area must depend on surface runoff for recharge.

Little is known about groundwater below the Bearpaw Shale formation. If the Judith River formation extends to the Federal Bentonite claims, it is possible a deep well could yield a measurable amount of water. [1]

B. Biological environment

1. Vegetation

a. Claims area

Ecological Consulting Service (ECS) conducted a vegetation study of Federal Bentonite's overall claims area (Figure 1) from January 1976 to December 1976.[8] Seven types were identified in the claims area including: grassland, big sagebrush-grassland, creeping juniper-grassland, saltbush bottom, fringed sagewort-grassland, greasewood and barren bentonite or rock outcrops.

Common grasses and grass-like plants in the grassland community type (969.6 acres, 4.8%) were little bluestem (Andropogon scoparius), blue grama (Bouteloua gracilis), and sedges (Carex spp.). Rose (Rosa spp.) was the only important shrub in this type. Important forbs in this type were buckwheat (Eriogonum multiceps), fringed sagewort (Artemisia frigida), bastard toadflax (Comandra umbellata), and prairie thermopsis (Thermopsis rhombifolia).

The most common grasses in the big sagebrush-grassland community type (6840 acres, 33.9%) were blue grama, western wheatgrass (Agropyron smithii), green needlegrass (Stipa viridula), sedges, and needle-and-thread (Stipa comata). The most common forbs in this type were fringed sagewort, bastard toadflax, and Hood's phlox (Phlox hoodii). Big sagebrush (Artemisia horizontalis) was the predominant shrub, but creeping juniper (Juniperus horizontalis), rubber rabbitbrush (Chrysothamnus nauseosus), and rose were also present.

Meadow foxtail (Alopecurus pratensis) and western wheatgrass were the common grasses in the silver sagebrush-grassland community type (5.3 acres, .005%). No significant forbs were noted in this area. Silver

sagebrush (Artemisia cana) was the common shrub, but a few big sagebrush plants were also noted.

The creeping juniper-grassland community type (7634 acres, 37.8%) had sedges, western wheatgrass, and little bluestem as common grasses. Important forbs were bastard toadflax, prairie thermopsis, and Hood's phlox. Besides creeping juniper, big sagebrush, rose, and rubber rabbitbrush were the other shrubs occurring in this type. [1]

Weeping alkali-grass (Puccinellia distans) was the most common grass in the saltbush bottom community type (3351 acres, 16.6%), and buckwheat was the most common forb. Saltbush (Atriplex spp.) was also present in these bottom areas, although it did not generally occur in very dense stands.

The common grasses in the fringed sagewort-grassland community type (80.8 acres 0.4%) were sedges, bluegrasses (Poa spp.), and tumblegrass (Schedonnardus paniculatus). Other forbs or half-shrubs occurring were Nuttall saltbush (Atriplex nuttallii) and plains pricklypear (Opuntia polyacantha). No other shrubs generally occurred within this type.

The greasewood community type, which was insignificant in this area, had western wheatgrass, bluegrass, and bottlebrush squirreltail (Sitanion hystrix) as its common grasses. Broom snakeweed (Gutierrezia sarothrae) and saltbush (Atriplex spp.) were the most common forbs. Greasewood (Sarcobatus vermiculatus) was the dominant shrub.

Bentonite outcrops with no appreciable vegetation amounted to 1212 acres, or 6% of the total claims area. Reservoirs and stock ponds in the claims area amounted to 103.1 acres, or 0.5% of the total. Existing pits in the area total 4.9 acres, or 0.005% of the total area. [1]

A list of the plant species identified on the Federal Bentonite claims area and a table showing the constancy, percent canopy coverage, and frequency of the species occurring in transects run in each community type is available in DSL's offices in Helena.

The range conditions at the sites where transects were run were generally found to be poor as is illustrated in Table 4. The average stocking rate for the claims area (from Table 4) has been computed at .134 A.U.M. (Animal Unit Months).

Table 4. -- Range site classification, range condition, and stocking rate for twenty-two transects run on the Federal Bentonite study area[1]

SITE NO.	RANGE SITE	RANGE CONDITION	STOCKING RATE*	COMMUNITY TYPE
1	Shallow clay	Good	.225	211
2	Shallow clay	Poor	.075	232
3	Shallow clay	Fair	.150	111
4	Shallow clay	Poor	.075	232
5	Dense clay	Poor	.075	211
6	Shallow clay	Poor	.075	211
7	Shallow clay	Excellent	.300	232
8	Shallow clay	Good	.225	211
9	Shallow clay	Poor	.075	232
10	Dense clay	Fair	.150	211
11	Dense clay	Fair	.150	212
12	Dense clay	Poor	.075	234
13	Dense clay	Fair	.150	211
14	Shallow clay	Poor	.075	111
15	Shallow clay	Good	.225	111
16	Saline upland	Poor	.025	111
17	Shallow clay	Fair	.150	211
18	Shallow clay	Excellent	.300	211
19	Shallow clay	Poor	.075	232
20	Saline upland	Good	.075	235
21	Dense clay	Fair	.150	233
22	Shallow clay	Poor	.075	211

---

*A.U.M.(Animal Unit Months).

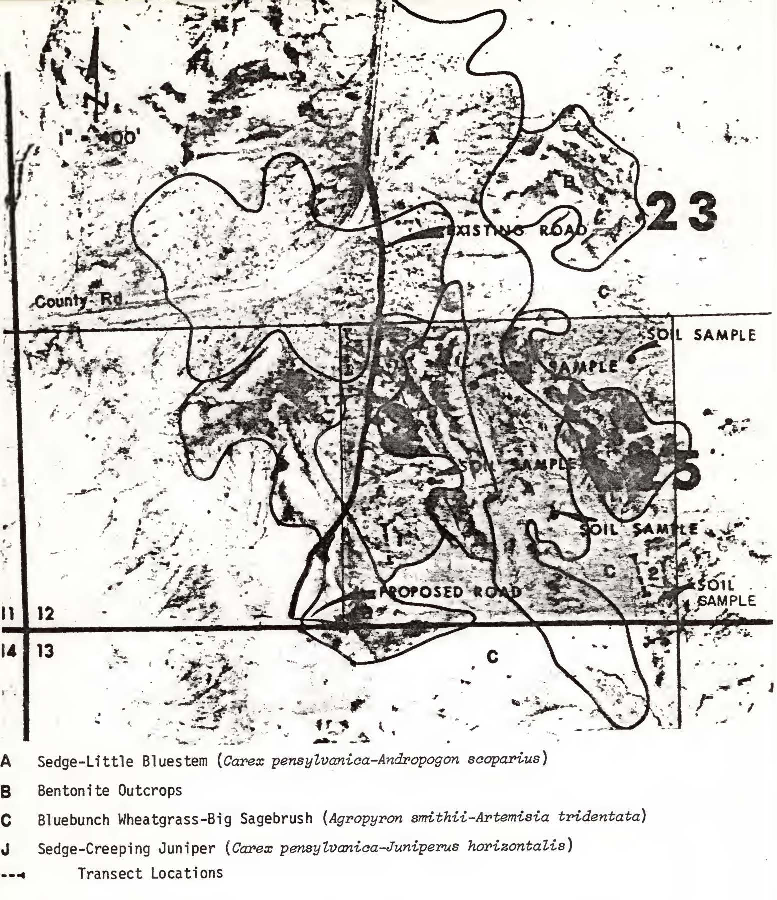
b. Contract area and plant site

Seven additional Daubenmire vegetation transects were run in the three undisturbed contract areas (in claims 15, 25, and 35 and 36) and each area was remapped.[9] The two former Hallett test pit areas were also remapped, even though no additional acreages would be disturbed at these sites. The vegetation community around these latter sites was predominately a grassland of the *Carex pensylvanica* - *Andropogon scoparius* type. A map of the proposed contract area in claims 25 is presented as an example for the reader (see Figure 6).

Three of the seven additional transects were run in the *Carex pensylvanica* - *Andropogon scoparius* type, which was the predominant vegetation type at each of the five contract areas. *Carex pensylvanica* was the dominant species at each transect site, with percent canopy coverages ranging from 11-13 percent. *Andropogon scoparius* was the second most dominant species at each site, with percent canopy coverages ranging from 3-5 percent. The only other species occurring at these sites with more than trace canopy coverages were *Agropyron smithii*, *Commandra umbellata*, *Eriogonum pauciflorum*, *Thermopsis rhombifloia*, and *Rosa arkansana*.

One transect was run in a big sagebrush-grassland (*Agropyron smithii* - *Artemesia tridentata*) community which accounted for a portion of one of the proposed contract areas (in claim 25). *Artemisia tridentata* and *Agropyron smithii* were the dominant species in this type with 9 and 8 percent canopy coverages, respectively. *Atriplex nuttallii*, *Opuntia polyacantha*, and *Chrysathamnus nauseosus* also occurred at this transect site with from 2-6 percent canopy coverages.

The Creeping Juniper-Grassland (*Carex pensylvanica* - *Juniperus horizontalis*) type occurred at four of the proposed five contract areas. Three additional transects were run in this type, for which *Juniperus*



A Sedge-Little Bluestem (*Carex pensylvanica-Andropogon scoparius*)

B Bentonite Outcrops

C Bluebunch Wheatgrass-Big Sagebrush (*Agropyron smithii-Artemisia tridentata*)

J Sedge-Creeping Juniper (*Carex pensylvanica-Juniperus horizontalis*)

▸---◂ Transect Locations

Figure 6. - Vegetation map of Federal Bentonite's proposed contract area in claim 25 (Section 12, T27, R36E).

horizontalis was the dominant species at each site with canopy coverages ranging from 12-21 percent. Carex pensylvanica was the second most dominant species of each of these sites with canopy coverages ranging from 7-19 percent. The other species which occurred at these sites with more than trace canopy coverages were Agropyron smithii, Andropogon scoparius, Eriogonum pauciflorum, and Thermopsis rhombifolia.

The canopy coverages for the seven additional transects run during the spring of 1977 were generally less than those for the previous transects in corresponding vegetation types.[9] This was probably due to the present contract areas being in less productive portions of the claim areas and the 1977 transects being run earlier in the year and during a drier year. Acreages of vegetation types in each of Federal Bentonite's five proposed contract area units are given in Table 5.

All of Federal Bentonite's proposed contract areas were classified according to SCS range site criteria. At all sites where there was vegetation, the range site classification was shallow clay, 10-14" P.Z., eastern glaciated plains of Montana, except for about 1.5 acres of the southwest corner of the contract area in claims 17, 18, and 19, which was classified as clayey, 10-14" P.Z., eastern glaciated plains of Montana. The Bentonite outcrops and barren areas in all of the claims areas were classified as shale, 10-14" P.Z., eastern glaciated plains of Montana.[1]

Table 5. -- Acreages of vegetation types in each of Federal Bentonite's five proposed mining areas[9]

VEGETATION TYPE	Contract Area in				
	Claim 15	Claim 17-19	Claim 25	Claim 35-36	Claim 118
	acres	acres	acres	acres	acres
Cape-Ansc	32.5	40.5	15.2	30.1	6.9
Cape-Juho	15.3	0	0.5	19.3	2.3
Agsm-Artr	0	0	11.5	0	0
Bentonite outcrop	22.2	7.0	12.8	20.6	1.3
Existing pit areas	0	32.5	0	0	12.0
TOTAL	70.0	80.0	40.0	70.0	22.5

2. Wildlife

ECS conducted a wildlife survey of a 170-square mile study area around Federal Bentonite's claim areas from January 1976 to December 1976.[8] Additional survey work was also conducted in the Spring of 1977 concentrating on the five proposed contract areas.[9] The following section is divided into a discussion of the wildlife study area (which includes Federal Bentonite's claims area) and of the proposed 295.90 acre contract area.

a. Claims area

Pronghorn antelope (Antilocapra americana) were the most common big game species found in the study area (1410 antelope were sighted in 247 observations during 1976, 8 antelope in 2 observations in 1977). Antelope generally wintered in the big sagebrush-grassland habitat, but moved into other habitat types, primarily the creeping juniper-grassland type during the rest of the year. Calculated fawn:doe ratios for July and August 1976 were 106:100, indicating good productivity for those antelope observed on the study area.

Mule deer (Odocoileus heminous) were the next most common big game species found in the study area (426 mule deer were observed in 80 observations during 1976, 3 mule deer in 2 observations in 1977). The big sagebrush-grassland habitat adjacent to Brazil Creek and on the rolling hills was the most important habitat type for the mule deer on the study area. Although mule deer were not very abundant on the area, their productivity appeared to be quite good. A fawn:doe ratio of 95:100 was calculated for September 1976 (based on 53 mule deer sighted in 16 observations), and an average fawn:doe ratio of 81:100 was calculated for the period September - December 1976.

A small number of white-tailed deer (Odocoileus virginianus) were sighted on the study area (8 observed in 5 observations during 1976), such sitings were made mostly along Brazil Creek.

A total of 22 coyotes were observed on the study area in 22 observations. Badgers (Taxidea taxus) were also observed. No other large predators were seen on the study area.

Few species of small mammals were observed on the study area. Richardson's ground squirrels (Spermophilus richardsoni) were common on the study area. White-tailed jackrabbits (Lepus townsendii) were also present, but not observed in large numbers. Cottontails (Sylvilagus spp.) were quite common along Brazil Creek.

A small number of western deer mice (Peromyscus maniculatus) were caught in the mining claims area in November 1976 (9 mice were caught out of a total of 240 trap-nights). Thirty western deer mice were caught in 600 trap-nights on the proposed contract area in 1977.

Sage grouse (Centrocercus urophasianus) were the most common upland game bird identified on the claims area (67 observed in 11 observations). This species was located almost exclusively within the big sagebrush-grassland habitat type. Two sage grouse wintering areas were located along Brazil Creek, outside of Federal's mining claims area. One sage grouse lek was observed immediately north of the mining claims area in a sagebrush-grassland habitat type that had substantial areas of bare ground.

A second sage grouse lek was located on the wildlife study area during the spring of 1977 although it was not near any of the present Federal Bentonite contract areas. [9] This was a small lek, with nine sage grouse and was located in the NW quarter of Section 34, R38E, T28N. This area had also been checked in the spring of 1976, but the lek was not noted at that time.

Sharp-tailed grouse (Pedioecetes phasianellus), ring-necked pheasants (Phasianus colchicus), and Hungarian partridges (Perdix peridx) were also present in small numbers in the general area, but were not observed by ECS on the mining claims area.

During the spring migratory period, large numbers of waterfowl utilize stock watering ponds within the claims area. Species observed include: mallards (*Anas platyrhynchos*), pintails (*Anas acuta*), American widgeon (*Mareca americana*), canvasback (*Aythya valisineria*), lesser scaup (*Aythya affinis*), redhead (*Aythya americana*), shoveler (*Spatula clypeata*), green-winged teal (*Anas carolinensis*), Canada geese (*Branta canadensis*), white pelicans (*Pelecanus erythrorchnas*), killdeer (*Charadrius vocilerus*), willet (*Catoptrophorus semipalmatus*), American axocet (*Recurvirostra americanus*) and coots (*Fulica americana*). Later in the year only teal and mallards were observed on the reservoirs in sizeable numbers. A pair of Canada geese were observed nesting on one of the reservoirs within the claims area. Broods of mallards and teal were observed on one of the reservoirs by DSL personnel in July 1977. Spotted sandpipers (*Actitus macularia*) were common along the shores of the reservoirs.

Golden eagles (*Aquila chrysaetos*) were common throughout the year on the study area, and 11 were observed in as many observations. Marsh hawks (*Circus cyaneus*) were the most common hawk observed within the study area. Other raptors observed were American kestrils (*Falco sparverius*) and Swainson's hawk (*Buteo swainsoni*). During December, January, and February, snowy white owls (*Nyctea scandiaca*) were also observed.

The most commonly observed song birds on the study area were horned larks (*Eremophila alpestris*) and meadowlarks (Sturnella *neglecta*). Other song birds observed included: vesper sparrows (*Pooecetes gramineus*) and Brewer's sparrows (*Spizella breweri*).

One reservoir on the study area has a population of large mouth bass (*Micropterus salmoides*). Two other reservoirs in the vicinity contain large mouth bass and one has rainbow trout (*Salmo gairdneri*). All three reservoirs are in areas of better quality soil than Federal's bentonite claim areas.

b. Contract area and plant site

Three small mammal trap-lines were run on the contract areas between June 3 and June 8, 1977, for five consecutive nights. [9] The catch at each site for the 200 trap-nights was of from 9 to 11 western deer mice (*Peromyscus maniculatus*). These results indicate rather consistent and low small mammal populations in each area.

Additional observations of wildlife or sign which are pertinent to the five proposed contract areas are discussed below: [8]

1. Four antelope (two does with two fawns) were observed one mile north of the Northern Hallett Pit in early June of 1977.

2. Two mule deer (does) were observed one-half mile southwest of the proposed contract area in claim 15 on a south exposure on June 1, 1977 and one mule deer was observed one-third mile north of this contract area running into a coulee bottom on June 13, 1977.

3. Occasional antelope tracks were noted on all proposed contract areas at various times, although most appeared to be made by individuals passing through the areas. Some of the tracks could have been those of mule deer (particularly on claim 15), and more tracks were noted at claims 35, 36 and 15 than on the others.

4. Four adult antelope were observed feeding south of the road between claims 35 and 25 in early June.

5. Several Richardson's ground squirrels (*Spermophilus richardsonii*) were observed in the vicinity of the contract areas, but not on them.

6. An old sage gruse feces and an old coyote feces were noted on the proposed contract area in claim 36 on June 1.

7. Antelope were noted in the vicinity of the county road, which runs northeast from the contract areas, on several occasions.

C. Human environment

1. Demographics

Valley County has a current population of about 13,000.[10] Between the years 1930 and 1970 the county saw enormous population fluctuations which coincided directly with the construction and operations of Fort Peck Dam and the Glasgow Air Force Base. Between 1960 and 1970 Valley County led Montana in population loss, with a decline of 32.8 percent. The population declined from 17,080 in 1960 to 11,471 in 1970. The population has been slowly increasing in the last few years to a present level of about 13,000. Glasgow, the county seat and the community closest to Federal Bentonite's proposed operation, had a 1970 population of 4700.[10]

2. Land use

Rangeland is the most common land use in Valley County, with small grains being limited pretty much to bottomlands along the major drainages. Only 0.8 percent of the total land area is currently classified as urban and built-up.[10] Average farm size in Valley County was 2698 acres in 1969. Land use in the claim area is almost exclusively range.

3. Local economy

The Glasgow area is the major trade center for northeastern Montana. Agriculture is still the single biggest source of personal income, with 25.1 percent of the total for the period 1968-72.[10] Government is the next biggest source of earnings, with 19.1 percent. Other earnings are spread out over a wide range of activities related to Glasgow's status as a trade center.

Median family annual income for Valley County in 1969 was $8,191. Fourteen percent of Valley County families in 1969 had median incomes below the poverty level.[10]

4. Social structure

The social structure in the vicinity of the claim area is ranch type-agrarian, while Glasgow's is urban.

5. Social services

Valley County (4974 square miles) has 2 weekly newspapers, 3 banks, 1 hospital, 1 radio station, 18 schools (12 elementary, 6 high school), and 1 public library.[9]

6. Archaeological and historical sites

Montana State University archaeologists conducted a comprehensive record search and ground truth investigation of Federal Bentonite's mining claims area in 1976 in order to comply with existing agency land use and cultural resource preservation laws and other regulations of the state and federal governments.

The study found 303 sites of prehistoric and recent historic activity (299 prehistoric, 4 historic) on the mining claims area.[11] The inventoried prehistoric sites represent activities associated with settlement (habitation), food procurement (bison kill/drives), raw materials procurement and tool production, and ceremonial systems. Observed archaeological features include: fire-broken rock, hearths, stone circles, rock clusters, cairns, stone piles, drive lines, rock alignments, and surface depressions. Available prehistoric artifacts include: projectile points, knives (bifaces), pieces esquillées, end scrapers, edge-retouched flakes, hammerstones, choppers, a zoomorphic stone effigy, lithic wastes, and ceramics. Two of the historic sites were homesteads on which homestead patents were issued in 1917 and in 1920. The homesteads were purchased by the Federal Government about 1935-36. Another historic site was a homestead which apparently was never formally claimed but "squatted" instead. The fourth historic site contained two bison horn sheaths and a 45 caliber lead slug. It was possibly a camp site.

Evaluation of the sites was based on BLM's Manual Release 6410, "Cultural Resource Evaluation System (CRES)" which evaluates the potential for yielding significant scientific/educational/recreational information, size, age, uniqueness and condition. Each site was assigned to the most appropriate significance category. Four sites within the claims area (1.3%) are of significance level 1 and qualify for nomination to the National Register of Historic Places (three were recommended for nomination). Thirty-three sites (10.9%) are of significance level 2; 146 (48.3%) are at significance level 3 and 120 (39.5%) are at significance level 4.

Mitigation recommendations were based both on the significance level of the site, and the potential for damage from the proposed mining operation and the imminency of such damage.

Mine pit boundaries within the 5 units of the proposed contract area were drawn to avoid as many heritage sites as possible. One site (24VL224) has been unavoidably included in Pit 15-3 (NE¼SE¼SE¼, Section 3, T27N, R36E). Two sites (24VL161; 24VL162) lie in the quarter section on which the proposed plant site is to be located. Site 24VL184 is located on a slight ridge between two Hallett pits on claim 17 (Lot 2, Section 12, T27N, R36½E). Seven other sites are probably close to the proposed pits area. Legal descriptions in the archaeological study are questionable as they have been found to be as much as three quarters of a mile in error due to the lack of topographic maps and aerial photos. The archaeologic surveyor's recommendations for individual sites are unreliable since their locations are inaccurate and may in fact be in the proposed pit areas.

7. Transportation

A Burlington Northern spur line exists from the proposed contract-plant area to the main line northwest of Glasgow. This spur line was built for the purpose of transporting bentonite. The mining area is

Evaluation of the study was based on [illegible] Information System [illegible]

[illegible]

[illegible] holdings of each [illegible]

[illegible]

linked to Glasgow by a county road. Glasgow has rail service by Burlington Northern and AMTRAK, and air service by Frontier Air Lines. Glasgow is located on U.S. Highway 2, the chief east-west artery in northern Montana.[1]

8. Taxes

Currently, Federal Bentonite pays an annual tax on the quarter section where the proposed plant site would be located. In 1976 Federal Bentonite paid a tax of $25.26 on this property.[1]

9. Agricultural production

Agricultural use on both the claims and proposed contract areas is restricted solely to range land. The entire claims area could presently support approximately 2707 A.U.M. while the proposed contract area could support approximately 40 A.U.M.'s. Range condition in the claims and proposed contract area is poor.

III. Environmental Impacts of the Proposals

A. Physical environment

1. Topography

The proposed bentonite mining would modify the topography of the mined area in that for the first cut and for isolated pits, a mound would be permanently left. Likewise, for some of the final cuts and for isolated pits, a pond would be left. The proposed drying facility should have little impact on the topography.[2]

2. Climate

Climatological impacts of the bentonite mining should be restricted to microclimatic changes as a result of the removal of vegetation, the releasing of dust into the atmosphere, slight topographic changes, and the presence of different colored stratum on the surface. Such impacts are expected to be minimal.[2] The drying facility should also have minimal impact on the climate.

3. Air quality

Bentonite mining degrades air quality in two ways: pollutants will be emitted from the vehicle exhaust stacks and dust will be generated from the mining and hauling activities. Dust from the removal of the bentonite should be minimal since mined material will be wet. Topsoil and overburden may be dry and disturbance of this material may generate some particulate matter. There may also be some dust from the stockpiled topsoil and overburden. Since bentonite is removed from small pits scattered throughout the mining area, long haul roads will be required. Trucks traveling on these roads between the pits and the drying plant area will generate particulate matter. Most of this road dust will settle within a few hundred yards of the haul road, but some of the very fine dust particles will remain suspended in the air for long periods of time.

Suspended particulate generated at the drying plant site will be caused by: (1) vehicle traffic in the plant area, (2) the rotary dryer used to remove moisture from the bentonite, (3) the vibrating screens, (4) loading the dried material into open railroad cars with a front-end loader, and (5) wind blowing across outdoor stockpiles and conveyor belts.

Heat for the rotary dryer will initially be supplied by number two diesel oil. Once the plant has become operational, the company will proceed to replace the fuel oil with a coal fired system. It is expected that work will begin in 1977 on the initial construction of footings for the coal handling system. Use of the coal handling system will not occur for about one year; however, when firing with oil, very small amounts of sulfur oxide and nitrogen oxides will be emitted from the drier. Once the conversion to coal firing has been made, about 62 pounds of SO_2 per hour of operation will be emitted from the drier as well as small amounts of nitrogen oxides. The rate of SO_2 emissions are within the established standards for coal fired plants. No standards have been established for nitrogen oxide emissions.

Increased travel (70-100 vehicles per week) is anticipated on the county road connecting the contract area and plant sites with Glasgow. The Burlington Northern spur line to the mine site, which has not been used to this point, will be utilized to carry the processed bentonite from the mine site to the Burlington Northern main line northwest of Glasgow. Both the road and railroad traffic will increase pollutant levels in the area.

Table 6. gives estimated emission rates for the activities in both the mining and plant areas. Admittedly the accuracy of these estimates is not very good.

Table 6. -- Estimated emission rates for proposed mine and plant sources (lbs. per hour unless specified)

	Carbon Monoxide	Exhaust Hydrocarbons	Nitrogen Oxides (NO_2)	Sulfur Oxides (SO_2)	Particulates
1 Tracklaying tractor[a]	<0.8	<0.8	1.6	< 0.8	<0.8
3 Scrapers[a]	1.6	0.8	6.3	0.8	0.8
1 Motor grader[a]	<0.8	<0.8	0.8	<0.8	<0.8
1 Wheeled loader[a]	0.8	<0.8	2.4	<0.8	<0.8
5 Heavy-duty highway trucks[a]	1.6	0.3	1.1	0.2	0.1
Earth movement in mining area[a]	---	---	---	---	760 lb/day
Wind erosion of spoil piles[b]	---	---	---	---	5.8
Haul road dust[a]	---	---	---	---	344.
Locomotive[b]	13.3 lb/day	9.6 lb/day	37.7 lb/day	5.8 lb/day	2.6 lb/day
Bentonite dryer[c]	---	---	---	62.	38.
Highway vehicles on county road[a]	44.7 lb/day	7.0 lb/day	12.0 lb/day	0.3 lb/day	0.6 lb/day
County road dust[a]	---	---	---	---	7,470 lb/day
Plant materials storage and movement[a]	---	---	---	---	156.

(a) Compilation of Air Pollutant Emission Factors, AP-42, February 1976.
(b) Final Environmental Impact Statement, Proposed Plan of Mining and Reclamation, East Decker and North Extension Mines, Decker Coal Company, Big Horn County, Montana[13]
(c) Based on particulate emission tests of this plant at a different location and sulfur analyses of the proposed coal

4. Geology

Except for the removal of several feet of bentonite clay, little to no impacts to the geology of the contract areas is anticipated.

5. Soils and overburden

Federal Bentonite's proposed reclamation plan calls for the discrete removal, stockpiling, and salvage of the top six inches of topsoil and the remaining viable subsoil from each series by scrapers.[3] This will result in the destruction of existing soil-plant relationships and soil profiles. There may be some re-establishment of certain features of the natural soil and plant community development, but long periods of time would be involved due to the arid nature of the area. The only feature that may form in substantially shorter periods of time are cracks that form as a response to shrinking and swelling of clays due to wet-dry cycles.[2]

As previously indicated, the subsoil and overburden are saline and sodic. Destruction of existing soil-plant-water-topographic relationships may bring about a different set of relationships which might result in the upward migration of salts from regraded spoils and subsoils in topsoil. As a result, the topsoil would become a less favorable rooting medium due to increased osmotic pressures of the soil solution and due to the possible adverse effects of sodium on soil physical properties.

Also, high exchangeable amonium concentrations in some of the subsoil and overburden layers could cause nitrification of the soils if they are relocated next to the surface. This could result in the accumulation of nitrates in the ponds and streams from surface runoff caused by rapid snow melt and violent summer thunderstorms.

Soil removal and handling will probably result in some compaction and degradation of soil structure which would have adverse effects on

[illegible]

[illegible]

[illegible] storage from surface [illegible]

[illegible]

permeabilities to water, air, and root penetration. It will expose the mined areas to potential accelerated water and wind erosion until a stable plant community can be established on the regraded and retopsoiled spoils. Soil stockpiles will also be subject to an accelerated erosion potential while they are extant.

6. Hydrology

Impacts to the hydrologic system should be minimal. The Bearpaw Shale formation and the bentonite beds thereon will effectively isolate any disturbance to existing groundwater conditions due to their properties as aquitards and aquicludes, respectively. Pits located in watercourses will result in ponds; pits excavated below the water table should maintain a water supply for at least part of the year from seepage.

DSL has noted that:[2]

> The probability of encountering ground water under a bed of bentonite in the contract area is relatively small. If water is encountered it would probably be confined to areas along zones of fracture in the underlying beds of shale. If such a zone were to produce large quantities of water under a signficant head, one would expect that water would have migrated horizontally and appear as a seep or spring along areas of outcrop. However, as such conditions do not exist in any of the proposed contract areas, any water encountered will probably not be in signficant quantities.

Mining operations may necessitate the diversion of drainages around exposed bentonite seams. This diversion should cause no significant effects to the system.

The only significant impact to the surface water system will be the storage of otherwise "lost" surface water in ponds during runoffs.

B. Biological environment

1. Vegetation

Damage to vegetation will range from relatively minor trampling by vehicles to total destruction by mining and haul roads. Such damage

would occur during both the premining and mining periods as well as during the construction period for the drier site. Vegetation compressed by drill trucks and other vehicles associated with premining activities would be little affected in all but wet periods. During wet periods such vehicles could cut deep ruts, killing vegetation. However, vehicle travel is nearly impossible at such times due to the nature of the area, and such rutting should be minimal.

DSL noted that:[2]

> During mining periods, some trampling/compressing activity would also occur, ranging from minor impacts by pickups to serious destruction by scrapers, loaders, and possibly haul wagons. Open pit mining results in total destruction of the vegetation in the pit area and under topsoil and overburden stockpiles.
>
> Dust generated from hauling and drying activities may impact adjacent vegetation. Dust settling on plants has three potential detrimental impacts:
>
> (1) Dust on leaf surfaces may cut down the photosynthetic ability of the plants. Also, dust may plug the stomas of leaves, thus decreasing the plants transpirational gaseous exchange ability. The impacts of dust on leaves may be especially important to seedlings.
>
> (2) Airborne dust may screen light from the plants, as airborne dust could have a fog-type effect. The magnitude of such impact would depend on the density of the dust. The closer to the source, the greater the impact.
>
> (3) Dust settling on leaf surfaces may also be detrimental to digestion of plants by herbivores.

Combustion product emissions from the drying operation should be at levels too low to impact the vegetation.

2. Wildlife

a. Contract area and plant site

Wildlife in the proposed contract area and plant site would be impacted by habitat destruction, and by the disruptions caused by increased human activity in the area. DSL has noted that:[2]

Destruction of sagebrush in the sagebrush/grassland habitat would significantly affect mule deer, sage grouse, and antelope. Sage grouse in the proposed disturbance areas would be affected the most. Sage grouse rely on sagebrush for both cover and food the majority of the year. Antelope utilize sagebrush heavily during the winter, but being more mobile the impact would be less than that on sage grouse. Mule deer rely on the sagebrush/grassland for food at intervals during the year. The loss of this type through destruction of the vegetation would essentially lower the carrying capacity of the whole area, forcing the animals presently on the proposed contract area onto less desirable areas, possibly resulting in their demise.

b. Claims area

Antelope and mule deer in the wildlife study area are highly dependent on both the big sagebrush-grassland and creeping juniper-grassland habitat types which comprise approximately 70 percent of Federal's claims area. Applying this figure to the 2000 acres which Federal Bentonite expects to mine in the next five years, approximately 1400 acres of these habitat types could be destroyed.

Since the wildlife study area comprised 108,800 acres, of which approximately 76,000 acres are big sagebrush-grassland and creeping juniper-grassland habitat types, the significance of the impact of the proposal on the mule deer and antelope in the area is highly dependent on the success of reclamation.

Waterfowl in the area could be beneficially impacted if additional water retention sites are successfully created by the mining and reclamation process.

Wildlife in the area would also be impacted by the increased activity in and access to the region, which could result in increased poaching and wildlife-vehicle collisions as well as increased hunter pressure. Since the antelope and mule deer productivity is high, they should be able to withstand the increased hunting pressure.

DSL has noted that other impacts to "peripheral wildlife" might include:[2]

> (1) interference with migration patterns and with local habitat use of such free-ranging species as antelope,
>
> (2) noise, resulting in a decrease in off-site habitat utilization by some species.

C. Human environment

1. Demographics

Impacts to the demographics of the Glasgow area should be minimal as Federal at this time anticipates bringing in only two managerial personnel from outside the area. The rest of those employed at the mine and drying plant would be hired locally.

For the first four to five years, Federal plans to utilize a total of approximately 17 people at the mine and plant - 16 laborers, 2 supervisors, and 1 clerical (13 mine, 5 plant, 1 common clerical).[12] After phase II (see page 9) of the drying operation becomes operational the plant should employ approximately 12 people; after phase III becomes operational the plant should employ approximately 50 people.[12] The number of mine employees should remain constant for the first few years of operation; with an expected eventual maximum of approximately 16 laborers and one supervisor. Eventually, Federal's plant and mill site could employ from 62-66 people.

2. Land use

Land use within the proposed contract area and plant site would change from range land to mining and light industrial. The total acreage affected (approximately 400 acres) is so small that initially at least land use impacts would be slight. Land use impacts would be considerably greater should the entire claims area eventually be disturbed. Long range impacts to land use will depend upon the success of bentonite pit

reclamation. Since only two personnel will be brought into Glasgow as a result of Federal's proposals land use changes in Glasgow from rural to urban use should be minimal.

3. Economics

Initially the local economy would be boosted to the extent that 19 jobs would be created as direct result of the proposed mine and plant. The estimated annual payroll of these jobs is $242,000. Also, royalties paid to the Brazil Creek Bentonite Company, owned by local interests, should amount to $52,000 the first year and increase to $120,000 per year when full production is reached.[1] Should phases II and III of Federal's plant operation eventually become operational, the payroll (to be spend largely in the Glasgow area) could well exceed ½ million dollars.

4. Social structure

Only minor impacts to the Glasgow area are expected as a result of an increase in the number of people employed in the industrial and mining industries.

5. Social services

Virtually no impacts are expected to the social services of the Glasgow area.

6. Transportation

Increased travel (70-100 vehicles per week) is anticipated on the county road connecting the mine and plant site with Glasgow. The Burlington Northern spur line to the mine site, which has not been used to this point, will be utilized to carry the processed bentonite from the mine site to the Burlington Northern main line northwest of Glasgow. No other significant impacts are expected.[1]

7. Archaeological and historical sites

Archaeological site 24VL224, which is of significance level 3, will be fenced until an archaeological team has studied the site and has reclamation [illegible]

[illegible]

retrieved the available information. Such retrieval would disrupt the site.

Site 24VL184 is within the bonded contract area for two Hallett pits. This site may not be affected if disturbance is confined to the immediate areas of the pits since the site is about 150 yards from each pit. This site is of significance level 4.

Of the two sites within the quarter sections designated for the plant site, one archaeological site (24VL162) was mapped and excavated by an archaeological team since it was in an area to be disturbed. The other site (24VL161) would not be disturbed by present plans and has not been mapped.

Other sites both on and off the proposed contract area may be disturbed by increased access to the area. Irresponsible use of off-road vehicles has been a destructive force in other areas. Damage may occur through ignorance of the archaeological sites locations, particularily since the legal description given in the archaeological study are often erroneous, although study of the site sketch maps may locate the site.

8. Aesthetics

DSL has noted that:[2]

> Aesthetics of the area would be impacted by bare mounds resulting from mining, and cuts and roadbeds associated with haul roads. Aesthetics would also be impacted by the noise and dust of the mining, hauling, and drying activities.

9. Taxes

When mining commences three taxes will be accrued by Montana and Valley County. Income tax would be paid by employees at the mine and by the Brazil Creek Bentonite Company on royalties. Also, county property taxes would be paid on the mining and processing equipment. Federal Bentonite is currently paying $35,000 per year for taxes on a similar

operation at their Colony plant in Wyoming.[12] Federal Bentonite must also pay a Resource Indemnity Trust Tax.[1]

DSL has noted that:[2]

> The Resource Indemnity Trust Tax is computed at a rate of one-half of one percent the gross value of the mineral at the mine head. Five thousand dollars is deducted from the gross value. The operator pays tax on the gross value over $25,000 plus a $25.00 annual fee.

Using a figure of 300,000 tons per year production and a mine head gross value of $3.00 per ton,[12] Federal Bentonite would pay an annual tax of $4500.

10. Agricultural production

Using an average A.U.M. per acre of 0.134 computed from Table 1, a maximum of 268 A.U.M. per year would possibly be lost during the course of mining and reclamation during the first five years. If reclamation is successful within five years, this should represent a maximum figure for the life of the mine. If reclamation is totally unsuccessful, a total of 1707 A.U.M. per year could be lost over the entire claim area (20,000 acres).[1]

11. Human health

Dust and noise created by mining and the processing facility would possibly affect human health. The primary impact would be to the mine operators, but local residents may also be affected to some degree.[2]

resulting [illegible] in Wyoming.[2]

[illegible] not a [illegible]

[illegible]

> The [illegible]
> it [illegible]
> of the [illegible]
> the [illegible]
> over [illegible]

Using [illegible]

[illegible] value [illegible]

[illegible] of $450,[illegible]

II. [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

for the life of the [illegible]

total of [illegible]

[illegible] acre[illegible]

III. [illegible]

Just [illegible]

[illegible]

[illegible]

IV. Mitigating or Compensating Measures

A. Physical environment

1. Topography

Impacts to the topography will be minimized by backfilling and grading whenever possible to avoid pits and mounds. Unless approved as a water retention site, final pits will be backfilled to the degree necessary to maintain natural drainage and eliminate boggy conditions. All grading of overburden or pit banks will be to a rolling topography to blend in with undisturbed areas with slopes no steeper than 3:1 unless topographic conditions dictate otherwise. Highwall conditions will be eliminated by backfilling and grading. [1]

In addition, Federal's reclamation plan states: [3]

> All access, haul or other support roads shall be located so that cuts and fills and the crossing of natural drainages and cultural sites will be minimized.

2. Air quality

Federal Bentonite Co. will employ a sprinkler truck to control dust production on roads and mining sites. The Company anticipates getting the water needed for this operation from seepage into their current pits and from a well they will drill in the plant area. Emissions from the drying facility will be controlled by watering, enclosing the equipment and the use of dust collection equipment.

Initially, there will be two enclosures at the plant site. The first will be a building housing the crude bentonite and roll crusher. Material from the stockpiled material inside this building will be put into the crusher bin by front-end loader. However, this material contains about 30 percent moisture and should not be a dust problem. The second building will be for crushed and dried bentonite storage. Product in excess of the capacity of this building will be stored outside. Windblown

dust generated from these outdoor piles of stored material can be alleviated by spraying the piles with water which causes a crust to form, thus significantly reducing fugitive dust. Initially, the bucket elevator which moves material from the roll crusher to the dryer, the dryer, the vibrating screens, a second bucket elevator for moving material from the screens to the radial stacker and a very small portion of the radial stacker will not be enclosed. Emissions from the dryer will be controlled initially by a Western Precipitation Multi-cone dust collector.

Once the company decides whether mills will be added to the plant, a baghouse or an electrostatic precipitator will be installed in series with the multi-cone unit. The eventual installation of this baghouse or electrostatic precipitator will be a condition of the first construction permit for the plant. The company reports that once the bucket elevators, screens and dryers are enclosed, dust-laden air from the bucket elevators, screens, dryers and air inside the building will all be cleaned by a baghouse or electrostatic precipitator. Combustion Engineering type RB mills which may be installed in the future do not have a discharge to the atmosphere. Leakage from these mills would be controlled by cleaning the in-plant air.

Some soils materials must be stockpiled for future use, and these stockpiles will be safeguarded from loss due to wind or water erosion by temporary revegetation with grasses.

Particulate emission tests will be conducted shortly after the initial plant startup and whenever a major process change occurs to insure that the process is in compliance with applicable air quality standards.

3. Soils and overburden

Federal Bentonite's reclamation plan specifies the separate salvage of surface soil and subsoil for subsequent redistribution during reclamation.

This approach allows for the most efficient use of what "good" topsoil is already available by preventing it from being intermingled with other less desireable subsoils. Also, this approach saves the native plant seed already present in the topsoil, which may enhance future revegetation efforts. Federal Bentonite proposes to strip off the top 6 inches of Elloam clay loam, Dilts-Lisam clays, Elloam gravelly clay, Thebo-Lisam clays, Elloam in the Phillips-Elloam complex, and Dilts in the Sunburst-Dilts complex. Also, the top 24 inches of Sunburst in the Sunburst-Dilts complex and Phillips in the Phillips-Elloam complex would be used for topsoil. Stripping depths are variable and will depend on site-specific evaluation of the major soil-plant systems.

Subsoil salvage would be limited to those portions which are suitable for use in seedling establishment. Layers that are highly saline, extremely sodic, or have excessive trace elements present would not be salvaged. This will prevent their deposition too near or on the surface where they could restrict plant growth. This process will also prevent those layers with high concentrations of exchangeable ammonium from being placed near the surface and thereby eliminate the threat of nitrates accumulating in streams and ponds.

Salinization of soil material after regrading and retopsoiling is a possibility, but is difficult to predict. It would depend on the new soil-plant-water-spoils-topographic relationships established after reclamation. Ripping of the overburden surface prior to laying down the subsoil once it is in place may help prevent the formation of a perched water table close to the surface which could result in increased salinization of materials. Ripping at the overburden surface would also help to provide a nonslip surface for the soils materials to rest on.

Utilization of overburden and soils from one pit to backfill and reclaim previously mined pits would help minimize the handling and compaction of soils materials.

Stockpiles which exist for long periods of time would be revegetated as necessary to prevent excessive erosion.

DSL feels that Federal should not place topsoil on all post-mined surfaces that were bentonite or rock outcrops prior to mining. Available topsoil is insufficient to cover all post-mined surfaces within the five contract area units with suitable depths of topsoil. Determination of where topsoil will or will not be spread would be determined by on-site inspection by DSL soils experts and company representatives.

4. Hydrology

Due to the water restricting properties of the shale and bentonite formations there should be minimal impact to the hydrologic system of the contract areas. Pits in watercourses will result in ponds; pits excavated below the water table should maintain a water supply for part of the year from seepage. [1]

Mining may necessitate the diversion of drainages around exposed bentonite seams, but the diversion should not cause significant damage to water systems.

The use of diversion dams and ditches will lessen the possibility of sedimentation and generally reduce the chance of water pollution, according to the consultants. The design of diversion structures will follow standards recommended by the Soil Conservation Service. Special consideration will be given to minimizing the possibility of offsite damage to downstream property in the event of an overflow or washout.

When it is feasible, ponds will be constructed for multiple-use

purposes. Such ponds can serve as wildlife and livestock watering sites, waterfowl habitat, erosion control, etc.[a/] All such sites will be subject to DSL approval and would be constructed to department specifications. In instances where the ponds would be used as wildlife sites, the Department of Fish and Game will be consulted.[1]

There should also be no danger of water quality degradation in the preparation of the bentonite for shipping. Excess water derived from the drying process will be released into the atmosphere in the form of water vapor.

B. Biological environment

1. Vegetation

Federal Bentonite Co. would reseed all areas disturbed by mining to a mixture of grasses and saltbush (Table 8). All seeding would be done with a drill on the contour, with some possible exceptions. In areas where slopes are steeper than 3:1, the seed would be broadcast and harrowed or dragged on the contour. Broadcast rates will be double those used for drill seeding. All seeding would be done between October 15 and April 15. All sites which are reclaimed as water impoundments would be planted around the perimeter with suitable vegetation.[1]

All newly seeded areas would be protected by fencing to prevent grazing by local livestock.

For the past two years DSL has conducted research on the reclamation of bentonite pits. Research plots have been established at seven sites in Montana and Wyoming including one plot near Federal's proposed contract area in the Glasgow vicinity. Currently study data is being summarized

---

[a/] In the past bentonite floors have been left bare with remanent bentonite in contact with impounded water resulting in turbid ponds. Presently the pit floors are being covered which hopefully will facilitate plant growth and decrease trubidity.

and results should soon be forth coming. Research findings regarding seed mixtures, seeding method, use of fertilizer, etc. should prove helpful to reclamation of Federal's proposed pit sites.

Table 7.-- Revegetation species for Federal Bentonite's proposed contract area

SPECIES	DRILL	BROADCAST
Agropyron smithii (western wheatgrass)	6 lbs/PLS*/acre	12 lbs.
Elymus triticordes (beardless wild rye)	6 lbs/PLS/acre	12 lbs.
Agropyron elongatus (tall wheatgrass)	8 lbs/PLS/acre	16 lbs.
Atriplex canescens (4-wing saltbush)	4 lbs/PLS/acre	8 lbs.

---

*Pure Live Seed.

2. Wildlife

Federal Bentonite's reclamation plan specifies the area be reclaimed to rangeland, wildlife habitat, and watershed. Although no effort will be made to replace the sagebrush and creeping juniper lost, the introduction of forbs by seeding and natural revegetation should provide sufficient browse, then combined with the existing browse on adjacent areas, to maintain wildlife forage levels close to their present values. Also, the hopscotch nature of bentonite mining with widely scattered pits will prevent the formation of any long, continuous barriers to the movement of wildlife as can be the case with other types of surface mines. [1]

C. Human environment

1. Historical and archaeological sites

Mitigation of impact on those sites listed as likely to be impacted either directly or indirectly would be based on the significance level of the site and the seriousness of the impact. Mitigation would consist of either no action, mapping of surficial features, mapping augmented by test excavation, or excavation. Initially, all sites which require mitigation will be identified and disturbance would be avoided until

mitigation measures, as approved by the DSL and the BLM, have been completed.

It was recommended in the archaeological study made of the claims area that: [11]

> ....surficial mapping programs should be detailed and comprehensive to yield a reliable document of feature configurations. The scale, scope, and intensity of subsurface testing programs should be designed to fit each specific situation. Mitigation of indirect effort requires a less complete record than is needed for direct effect situations where the record will be the only surviving manifestation.

2. Aesthetics

Reclamation work planned in conjunction with mining activities would help reduce aesthetic impacts. Recontouring, topsoiling and reseeding would be acomplished as the bentonite pits are completed where possible mounds and cuts would be contoured to fit into the surroundings. All road ditches would be reseeded. At the completion of mining and industrial activity, reclamation, if successful, should return the contract and plant areas to an aesthetic setting similar to that which existed prior to disturbance. [2,13]

3. Agricultural production

Rangeland would be reseeded and, if reclaimed, could have as high or higher capacity than it had previous to mining.

V. Comparison Between Short-Term Costs and Long-Term Productivity

Present and long-term use of the land is as range/wildlife habitat, recreation, and watershed. Short-term use of the land would be for open pit mining and light industrial uses. If reclamation is successful, such present and long-term uses are not incompatible. At .134 A.U.M. per acre the projected five year acreage disturbed (2000 acres) would support 268 A.U.M. If it takes five years for complete reclamation, and if unavailable to stock for the entire period, a maximum loss of 2680 A.U.M. of livestock production should result, should successful reclamation take 10 years 4360 A.U.M.'s would be lost. Loss of wildlife habitat would also occur during the reclamation period.

Recreational use of the mined land for such purposes as hunting, rock collecting etc. would be denied for at least the active mining period and perhaps a portion of the reclamation period as well. Devices such as diversion ditches and sedimentation ponds should ensure that watershed capabilities of the area do not suffer.[1,2]

Comparison Between Short-Term Forecast and [illegible]

[illegible] and [illegible] of the [illegible] period [illegible] "Short-term [illegible] [illegible] such present [illegible] compare [illegible] the [illegible] [illegible] should [illegible] take [illegible] [illegible]

[illegible]

VI. Irreversible, Irretrievable Committments of Environmental Resources

A. Mineral

Since Bentonite is a non-renewable resource, once it is removed from the ground it would not be renewed. The mining process is for all intent and purposes irreversible.[2]

B. Energy consumption

Energy consumption in the mining and processing of bentonite is considerable. Federal Bentonite expects to consume 800,000 BTU's per ton to process the bentonite for shipment.[12] Estimated energy consumption for the mining and hauling process is 286,000 BTU's per ton.[14] This gives a total energy consumption for Federal's Glasgow project of 1,086,000 BTU's per ton of bentonite processed. Additional energy would be consumed in transportation of the processed bentonite.

C. Surface productivity

Surface productivity, including soils, vegetation, wildlife and wildlife habitat, would be sacrificed for mining in the short term. Hopefully such productivity can be restored through the reclamation process.

The Department of State Lands and the U.S. Geological Survey have noted that:[13]

> Mixing of soil horizons, thus altering the existing natural soils and changing the physical, chemical, and biological characteristics that determine their productive capacity, cannot be avoided. Soil properties such as texture, structure, pH, SAR values, and organic-matter content would be irreversibly altered. If reclamation obtained some loss of productive capacity of the soils would be an irretrievable committment of resources....
>
> ....plant species or communities requiring topo-edaphic conditions that are not duplicated by reclamation practices would be lost for perhaps hundreds of years.

D. Archaeological and historical sites

Archaeological sites would be destroyed whether such sites are mined or excavated by archaeologists. The Department of State Lands and U.S. Geological Survey has noted that:[13]

> Archaeological and historical resources are nonrenewable. In the event that significant sites are discovered and enforcement of regulations is inadequate, archaeological and historical resources could be irretrievably lost. In addition to the loss of physical resources, educational and scientific information regarding prehistoric environments and our natural and cultural heritage could also be lost.

E. Aesthetics

The Montana Department of State Lands and U.S. Geological Survey have noted that:[13]

> Loss of open space qualities and areas where man's influence has been minimal are becoming increasingly important in environmental decisions. For many people, any loss or degradation in aesthetic resources is an irreversible and irretrievable commitment of that resource. In a rapidly expanding, complex, technological world, areas of peace and tranquility have been recognized as valuable resources.

VII. Alternatives to the Proposed Actions

A. Montana Department of State Lands

1. Denial of contract

Denial of the contract by DSL would cause Federal Bentonite to abandon its development in the Glasgow area. As a result Burlington Northern would remove the tracks to the processing site, and the bentonite would not be mined in the near future. Also, the jobs which the development would create would be lost, as would additional jobs which would be created as production increased.[1,2]

The positive aspect of denial of the contract would be that none of the adverse impacts would be realized.[1,2]

2. Change of mining and/or reclamation plan

Federal's mining plan could be altered to eliminate mounds and ponds. If the overburden from the first pit were stockpiled and placed in the final cut, the topography could be returned to its original configuration. Should changes in the mining and/or reclamation plan occur they would have little to no effect on Federal's proposed drying operation.

3. Change method of mining

Presently, other reasonably economical, feasible methods of mining bentonite are not known. Should changes in the method of mining occur in the future they would have little to no affect on Federal's proposed drying operation.

B. Montana Department of Health and Environmental Sciences

1. Denial of construction permit

Denial of construction permit for Federal Bentonite's bentonite drying facility would probably cause Federal's proposed mining activity in the county to be dropped. Marketing requirements and transportation costs necessitate the reduction of the bentonite moisture content from

30 percent to 10-14 percent prior to rail shipment.

2. Conditional approval of construction permit

Pursuant to their duties under the Clean Air Act, DHES could require Federal Bentonite Company to install or modify equipment at their drying operation so that the abatement of air pollution at the plant was consistent with the highest state of the art. The costs of such changes should not be so expensive as to cause Federal to abandon their plans.

3. Unconditional approval of construction permit

DHES could approve Federal's approval for an air quality construction permit without modification in dryer plant design or equipments. Impacts of such an action are discussed in this draft impact statement.

VIII. Source Material Used in Preparation of the Draft Environmental Impact Statement

A. References cited

1. Econ Inc., Ecological Consulting Service Division, 1977. Environmental impact report for bentonite mining in Valley County, Montana, prepared for Federal Bentonite Division, Aurora Metal Company.

2. Montana Department of State Lands, 1976, Draft Environmental Impact Statement for the Proposed Open Cut Mining Contract for American Colloid Company, Helena, Montana.

3. Federal Bentonite Company, 1977, Division of Aurora Metal Company, Reclamation Plan for an Open Cut Mine Contract near Glasgow, Valley County, Montana. Submitted to the Montana Dept. of State Lands pursuant to Chapter 15, Title 50, R.C.M. 1947 and MAC 26.210(6)-510110.

4. Federal Bentonite Company, 1977, Division of Aurora Metal Company, Application for a Construction Permit for a bentonite drying facility in Valley County, submitted to the Montana Dept. of Health and Environmental Sciences pursuant to Chapter 39, Title 69, R.C.M. 1947 and MAC 16.214(1)-S1400.

5. Anon, 1972, Belle Fouche Salutes the Bentonite Industry, The Belle Fouche Daily Post, Vol 70.

6. Montana Testing Laboratories, Inc. 1977, Soils Study for Federal Bentonite's Claims Area near Glasgow, Montana, by Raymond T. Choriki and Ernest K. Hogan, prepared for Federal Bentonite Company and submitted to the Montana Dept. of State Lands pursuant to Chapter 15, Title 50, R.C.M. 1947 and MAC 26.210(6)-510110. Part I - Soils classification and mapping of bentonite area near Glasgow, Valley County, Montana, Part II - Chemical analysis of horizon from major soils present to predict optimum depth of stockpiling of the top soils for revegetation purposes, Part III - Relationship of chemical and physical characteristics of the overburden material for revegetation purposes near Glasgow, Montana.

7. Montana Testing Laboratories, Inc., 1977. Soil suitability for use as topsoil for revegetation as related to present vegetation, by Raymond T. Choriki and Ernest Hogan, prepared for Federal Bentonite Co. and submitted to the Montana Dept. of State Lands pursuant to Chapter 15, Title 50, R.C.M. 1947 and MAC 26.210(6)-510110.

8. Econ Inc., Ecological Consulting Service Division, 1977, Wildlife and wildlife habitat - four season baseline including vegetation community type

mapping, prepared for Federal Bentonite Co. and submitted to the Montana Department of State Lands pursuant to Chapter 15, Title 50, R.C.M. 1947 and MAC 26.210(6)-510110.

9. Econ Inc., Ecological Consulting Service Division, 1977, Supplement to vegetation and wildlife report for Federal Bentonite proposed contract area, prepared for Federal Bentonite Co. and submitted to the Montana Dept. of State Lands pursuant to Chapter 15, Title 50, R.C.M. 1947 and MAC 26.210(6)-510110.

10. Montana Department of Community Affairs, 1975, Valley County Profile, Division of Research and Information Systems, Helena, Montana.

11. Fleshman, Howard G., 1977, Vice President and General Manager, Federal Bentonite, personal communication.

12. Montana State University, 1976, Reserved natural and cultural heritage resources in the Brazil/Little Beaver Creeks Bentonite Mining Claim Area, Southwest Valley County, Montana, by Leslie B. Davis and Stephen A. Aaberg, 2 Vols., submitted to the Montana Dept. of State Lands pursuant to Chapter 15, Title 50, R.C.M. 1947 and MAC 26.210(6)-510110.

13. U.S. Geological Survey, Montana Dept. of State Lands, 1977, Final environmental impact statement, proposed plan of mining and reclamation, East Decker and North Extension Mines, Decker Coal Company, Big Horn County, Montana, 2 vol. 871 pp. & appendices.

14. Battelle, 1975, Energy Use Patterns in Metallurgical and Nonmetallic Mineral Processing Report to the U.S. Bureau of Mines.

B. Contributors

Coefield, John, Meteorologist, ECS*
B.S., Meteorology, 1975, Montana State University

Ellerhoff, Thomas, Technical Writer, DHES**
B.S., Science Journalism, 1967, Iowa State University

Gray, Fred, Environmental Engineer, DHES
B.S. Chemical Engineering, 1958, Montana State University

Harrington, Neil, Soils Scientist, DSL***
B.S. Agricultural Business, 1974, Montana State University
M.S. Soil Ecology, pending, University of Calgary.

---

*Ecological Consulting Service, division of Econ Inc., Helena, Montana
**Montana Department of Health and Environmental Sciences
***Montana Department of State Lands

[illegible]
and [illegible] to the [illegible]
[illegible]

9. [illegible]

10. [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Hayden, Brace, Environmental Coordinator, DSL.
B.S., Agricultural Economics, 1969, University of Calif. (Davis)
M.S., Resource Conservation, 1975, University of Montana

Hemmer, Dennis, Vegetation Analyst, DSL.
B.S., Wildlife Biology, 1971, University of Montana,
M.S., Resource Conservation, 1975, University of Montana

Juntunen, Richard, Chief, Coal Bureau, DSL.
B.S. Fish and Wildlife Management, 1971, University of North Dakota

Krott, Richard, Draftsmen-Cartographer, ECS.

Murphy, Joseph, Chief, Open Cut Bureau, DSL.
B.A., Liberal Arts, 1972, University of Montana.

Reichelt, Les, Wildlife Biologist/Plant Ecologist, ECS.
B.S., Fish and Wildlife Management, 1970, Montana State University
M.S., Fish and Wildlife Management, 1973,Montana State University

Vorozilchak, JoAnn, Asst. Environmental Coordinator, DSL.
B.S., Environmental Engineering, 1975, Montana College of Mineral Science and Technology.

C. Other agencies contacted

Montana Department of Community Affairs

U.S. Bureau of Land Management - Lewistown Office

APPENDICES

A - Correspondence regarding validity of mining claims located for bentonite in Montana

B - Legal description and acreage of Federal Bentonite's proposed contract area

C - Example mining sequence for bentonite pits

D - Listing of uses for bentonite

3920 (943.15)

June 2, 1977

Mr. Howard G. Fleshman
Vice President and General Manager
Federal Bentonite
1019 Jericho Road
Aurora, Illinois 60538

Dear Mr. Fleshman:

This is to confirm the position of BLM as expressed by David Sinclair of this office, on May 20, concerning validity of mining claims located for bentonite in Montana. We feel that the Bureau now has an affirmative obligation to determine whether bentonite being mined from unpatented mining claims under the mining laws is a locatable mineral, as defined by our recently published bentonite criteria (Instruction Memorandum No. 77-226), or whether it would be salable under the Materials Act of July 31, 1947.

We propose to begin the field examination of Federal Bentonite claims on August 15, 1977. The field examination will cover those claims listed in the reclamation plan submitted to the Montana Department of State Lands for the Glasgow area. We would like to meet your field representative at a location of your choosing at that time. We would appreciate any drill sampling data which you might have concerning the quality of the bentonite you propose to mine. If this information is not available at your field headquarters, we would be willing to send a representative to your headquarters in Aurora or make whatever arrangements you might suggest.

We look forward to working with you in making this determination. Hopefully, the validity determination can be completed with little or no impact on your scheduled development.

Sincerely yours,

/s/ Eugene H. Newell

Eugene H. Newell
Chief, Division of Technical
Services

Appendix B - Legal description and acreage of Federal Bentonite's proposed contract area

PROPOSED GLASGOW MINE DEVELOPMENT

Claim	Description of Contract Area	Acres
15	SW¼SE¼SW¼, S½SW¼SW¼, Sec. 2 T27N, R36E SW¼NE¼SE¼, N½SE¼SE¼, SE¼SE¼SE¼, Sec. 3, T27N, R36E	70.00
25	SE¼SW¼, Sec. 12, T27N, R36E	40.00
35	N½SW¼SW¼, N½S½SW¼SW¼, Sec. 9 T27N, R36E	30.00
36	S½NW¼SE¼, N½SE¼SE¼, Sec. 8 T27N, R36E	40.00
	Subtotal Acres	180.00

OPENED BY HALLET

Claim	Description of Contract Area	Acres
17	NW¼ Lot 2, Sec. 12, T27N, R36½E	10.00
18	N½NE¼NE¼, NE¼NW¼NE¼, SE¼NW¼NE¼, SW¼NE¼NE¼, Sec. 12, T27N, R36E	50.00
19	S½SE¼SE¼, Sec. 1, T17M, R36E	20.00
118	E½SE¼SE¼, Sec. 25, T28N, R36E	20.00
14A	NW¼NW¼SW¼SW¼ Sec. 30 T28N R37E	2.50
	Haul Road Acreage	13.40
	Total Acreage	295.90

PROPOSED AND EXISTING HAUL ROADS

Claim 15: Proposed road will run in an easterly direction from the extreme southeast corner of the contract area of Claim 15, following the section line between 2 & 11 approximately 3,200 feet to the section corner of 2,1,11, & 12. Continuing east from that point along the section line between 1 & 12 approximately 1,800 feet until intersecting the main existing road at a point in Sec. 1. The road will be on the north edge of the section line so there will be no disturbance of U.S. Survey markers.

Approximate total length of road - 5,000 ft.

Approximate total acreage of road - 4.6 acres

Maximum width of raod - 40 ft.

Claim 25: Proposed road will run from the extreme southwest corner of the contract area of Claim 25 in a northwest direction approximately 390 feet where it will intersect an existing road as shown on the 1" to 400' aerial maps and our 1" to 100' maps.

Total length of this road - 390 ft.

Total acreage for this road - .4 acres

Maximum width - 40 ft.

Existing road from proposed road on claim 25 to county road - 1.8 acres

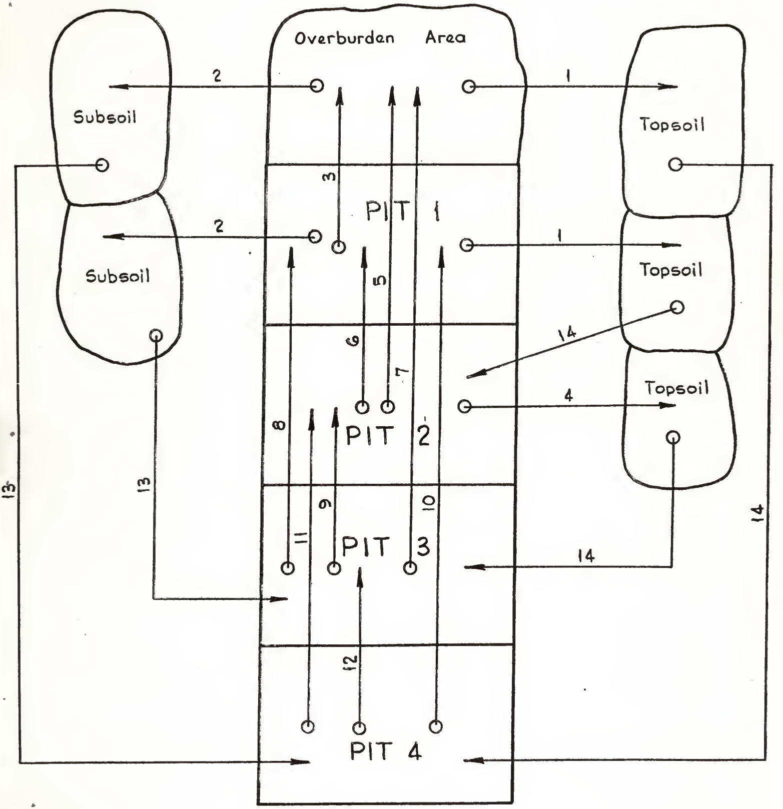
Claim 17, 18, 19 - Have existing road to Hallet pits - 4.1 acres

Claim 36 - Access road 40' wide, 660' in length adjoining east side of S½NW¼SE¼ - 0.6 acres

Claim 118 - Has existing road to Hallet pit - 1.9 acres

Total haul road acreage - 13.4 acres

Appendix C - Example mining sequence for bentonite pits



Appendix D - Listing of uses for bentonite

The Daily Post
Tuesday, September 26, 1972
Belle Fourche, S. D.

BENTONITE--The Clay of 1000 Uses

(You Think We're Kidding?)

Bentonite has for many years been called "The Clay of 1000 Uses", and a list of the products in which the strange clay is involved indicates the number is not an excessive exaggeration.

Here are some of the products in which bentonite is used, either in processing of the products or in the item itself. This list is by no means complete, since new uses are being found periodically.

abrasive wheels
asphalt roads
arc-welding
building blocks
batteries
clay brick
clarifying agent (wine, vinegar, oil)
cold-water paints
cleansing agent
casein
dentifrices
degreasing (hides, wool)
dikes
electrolyte solution
floor emulsions
facial clay packs
fire brick
foundry sand
gypsum
golf green binder
horticultural sprays
insecticides
internally (X-rays)
irrigation ditches
lead pencils
leather treatment
magnesia
mortar
mining
nitro-starch explosives
porcelain
plaster
paste
phonograph records
paper
pipes
refining (fats, greases)
reservoir walls
seed disinfecting
sewer pipe
sizing agent (cord)
sewage treatment
shoe polish
tar varnishes
water colors
wall sealing agent
Zeolite water softeners
asbestos
auto-polish
beauty clays
bleaching agents
concrete
crayons
calcimines
crude oil
dynamite
dry cells
de-inking agent
detergents
enamels
fertilizer
fire extinguishers
filtration
germicides
glauconite cement
graphite crucibles
highways
insulators
insulation board
kerosene
lubricating oil
lacquers
masonary cement
magnesium
mechanic's soap
ointments
plastic
poles
printer's ink
paints
paperboard
rubbing stones
rubber
sheep & cattle dips
spark plugs
slag cement
stock feed
scouring soaps
stove polish
textile printing
waterproof concrete
wall board
well drilling (oil)
artificial stone
anticorrosive
bricklayers cement
briquets
blood albumen
cement tile
cork
cardboard
chicle
dye fixatives
dust preventive
dams
electrical insulation
fungicides
face cream
fire clay
fruit juices
glazes
glue
gelatinizing agent
hair treatment
indelible lead
insulation blocks
linoleum cement
laxatives
latex
matches
medicinal emulsions
metal polish
oil paints
pottery
posts
pastel colors
putty
plaster board
roofing paper
rosin preventive
rosin
rubber tire puncture preventative
stucco
sizing (cotton, yarn)
sticking agent (sprays)
special soaps
thread cutting compounds
valve-grinding compounds
wood dips
waterproof paper
water coagulant

S
~~622.361~~
L3dp
~~1977~~

STATE OF MONTANA

DEPARTMENT OF STATE LANDS

MAILING ADDRESS: CAPITOL STATION
OFFICE: 1625 11TH AVENUE
HELENA 59601
(406) 449-2074

STATE BOARD OF LAND COMMISSIONERS
THOMAS L. JUDGE
GOVERNOR
GEORGIA RICE
SUPT. OF PUBLIC INSTRUCTION
FRANK MURRAY
SECRETARY OF STATE
MIKE GREELY
ATTORNEY GENERAL
E. V. "SONNY" OMHOLT
AUDITOR

LEO BERRY, JR.
COMMISSIONER

SCHOOL LANDS

August 29, 1977

STATE DOCUMENTS COLLECTION

DEC 21 1977

MONTANA STATE LIBRARY
930 E Lyndale Ave.
Helena, Montana 59601

On June 23, 1977, Federal Bentonite Co., a division of Aurora Metal Co. of Aurora, Illinois, filed an application with the Department of State Lands for an open cut mine contract on 295.9 acres near the town of Glasgow, Valley County, Montana. Such acreage would be utilized for bentonite pits, haul roads, and associated disturbance. The department issued a Draft Environmental Impact Statement (EIS) on the Federal Bentonite Co.'s proposal on August 11, 1977.

Letters of response to the draft EIS were received from the following:

Olson-Elliott & Associates, Scientific Consultants

Pursuant to Section 26-2.2(18-P290)(2)(a) of the department's rules implementing the Montana Environmental Policy Act, the department has determined that the draft EIS satisfies the requirement for a final EIS. Accordingly, the department is sending a copy of all comments received in response to the draft statement and department's responses to such comments to the Governor, Environmental Quality Council, Federal Bentonite Co. and to others who received copies of the draft EIS.

Normally 30 days would be allowed for receipt of public comments; however, because of the tight decision-making time frames of the Open Cut Mining Act, the department intends to issue an open cut mine contract for Federal Bentonite's proposed mine and facilities on August 29, 1977. The Open Cut Mining Act allows only 60 days for the department decision making once a complete contract application has been received; Federal Bentonite's application was complete on June 29, 1977.

Sincerely,

Brace Hayden

Brace Hayden, Administrator
Reclamation Division

jb

PLEASE RETURN

DATE DUE
MSL MAR 1 '78

Department of Health and Environmental Sciences
STATE OF MONTANA HELENA, MONTANA 59601
A. C. Knight, M.D.
DIRECTOR
ENVIRONMENTAL SCIENCES DIVISION
Board of Health Building
(406) 449-3946

August 29, 1977

Mr. Ralph Driear
Department of State Lands
1625 11th Avenue
Helena, MT 59601

Dear Mr. Driear:

The Department of Health and Environmental Sciences will continue to accept comments on the draft environmental impact statement (EIS) until the 30-day comment period ends, September 10, 1977. The department has given Federal Bentonite Company permission to begin preliminary construction of the drying plant based on the condition that if the draft EIS reveals any significant reasons for reexamining the proposed conditions of the permit, work on the plant will cease until all problems have been satisfactorily resolved.

Sincerely,

Thomas M. Ellerhoff
Technical Writer

TME:dmg

OLSON–ELLIOTT & ASSOCIATES
SCIENTIFIC CONSULTANTS
P. O. Box 1209
349 Last Chance Gulch
Helena, Montana 59601
Phone: (406) 443-5560

August 19, 1977

Mr. Brace Hayden
Environmental Administrator
Department of State Lands
Capitol Station
Helena, Montana 59601

Dear Mr. Hayden:

We appreciate the opportunity to comment on the EIS for the the proposed Federal Bentonite Company mine. The following comments address the vegetation portion:

1. It is very doubtful that 14 total vegetation transects are adequate to describe the vegetation types in the area within reasonable statistical limits. Without additional data, it will probably not be possible to determine if reclamation efforts meet the conditions prior to mining. Because of the relatively poor condition of the area, this should be very important in determining reclamation success.
2. Pages 25 and 26 are in the wrong location.
3. There are no data depicting vegetation production (clipped plot, etc.).
4. Table 4, page 26 is apparently in error since the AUM values must be on a per acre basis as the site numbers do not refer to areas. There are no estimates of livestock production capabilities (totals) for the area.
5. There is no correlation or cross discussion of the soils mapped on the area with the range site data or the vegetation data.

I hope these comments are of use to you in preparing the final EIS.

Sincerely,

Dana C. Schmidt
President

DCS/dmp

DEPARTMENT OF STATE LANDS' RESPONSE TO THE LETTER FROM OLSON-ELLIOTT & ASSOCIATES

1. A total of 29 vegetation transects were conducted on Federal Bentonite Co.'s claims area in Valley County, seven of which occurred on the proposed contract area. The Department feels that such transect data is adequate to describe the existing vegetation condition within the contract area for the purpose of determining reclamation success.

2. Comments duly noted.

3. Since bentonite claims areas are predominantly characterized by sporadic and overgrazed range sites, the department feels that range site capability information is adequate and that information pertaining to vegetation production is of limited value.

4. The stocking rates as presented in table 4 represent the A.U.M. value per acre of the vegetation community type identified for each of the transect site numbers. DSL's bentonite baseline study guidelines which were established to comply with the intent of the Open Cut Mining Act do not require estimates of livestock production capabilities.

5. Range site data presented in the EIS incorporates soils information into its data base. A brief discussion of the correlation between vegetation present and soil reclamation suitability is presented on page 22 of the draft EIS. For a further discussion, see reference cited #7, Montana Testing Laboratories, Inc., 1977. Soil suitability for use as topsoil for revegetation as related to present vegetation, by Raymond T. Choriki and Ernest Hogan, prepared for Federal Benonite Co. and submitted to the Montana Department of State Lands pursuant to Chapter 15, Title 50, R.C.M. 1947 and MAC 26.210(6)-510110.

Since the issuance of the draft EIS, additional archaeological information has been obtained from the proposed mining claims area. The following letter from Ecological Consulting Service explains the recent new information and change of classification of one site in particular. The department recognizes the potential importance of the archaeological features of the mining area and will provide for their proper mitigation and protection in the mining permit. The department feels that in the strict sense the archaeological excavation or salvage of a cultural resource is an irretrievable commitment of that resource. However, the data obtained in salvage are contributions to knowledge which could not be obtained otherwise, and as such produce benefits which offset the commitment.

ECON
ECOLOGICAL CONSULTING SERVICE

ECON INC.
Airport Way Building West
1300 Block, Cedar Street
Helena, Montana 59601
Telephone
406/442-4650

August 26, 1977

Mr. John Fields
Bureau of Land Management
P.O. Drawer 1160
Lewistown, Montana 59457

Attention George Ruebelmann

Dear George:

Les Davis' report to us on Site 24VL224 is as follows:

"Unanticipated discovery of additional and more widely distributed features at previously recorded Site 24VL224 within Claim 15, the only bond area scheduled for summer 1977 mining, led to permission by the BLM, Lewistown District, to conduct a limited sub-surface testing program to record and ascertain the nature and significance of remnant deposits. Initially, the surficial features (stone circles and rock clusters) were mapped in detail and later transferred to a topographic map. Then, 5 limited-area test pits were excavated at strategic locations in and apart from features where exposed remains indicated concentrated residues (see EXHIBITS E.3 and E.4). The tests yielded a few widely dispersed waste flakes and the occasional, isolated fire-broken rock. Intensive surface examination produced 5 fragmentary projectile points. Four fragments represent small, triangular side-notched and unnotched arrowpoints attributable to the Old Women's phase (A.D. 750-1800) of Northwestern Plains prehistory. These points may reflect activities associated with the presence of stone circles, rock clusters, and a petroglyph boulder. The fifth point fragment is stemmed and lanceolate in form characteristic of the McKean complex (2500 to 1500 B.C.). Surface examination led to recognition of a 400-lb pink granite petroglyph boulder (EXHIBIT E.4). This subtle feature (subtle by reference to shallow pecking and the low relief petroglyphs) was collected to prevent loss.

Site 24VL224 is located on top of and on the weathering slopes of a moderately prominent knoll. Erosion has attenuated the original form of some features, moderately to severely. An undisturbed, buried cultural deposit is apparently lacking. The surficial presence of diagnostic artifacts elevates the original CRES 3 determination to CRES 2. Given the weathered state of site features and the lack of a demonstrably direct association of features and artifacts, this site fails to meet National Register nomination criteria. In my opinion, the negative results of limited sub-surface testing and the positive existence of a two-dimensional record of feature form and distribution together with diagnostic artifacts constitute circumstances sufficient to merit affirmative consideration of a motion to declare the site mitigated.

The immediate next step in the cultural resource protection program in the Brazil and Little Beaver Creeks bentonite mining area requires action on the part of the Company to ascertain the feasibility of avoiding sites in future bond areas for which significance determinations and consequent values requiring protection have been specified. The Company will then propose that those sites which cannot be economically avoided and/or otherwise preserved be accorded necessary technical attention. The study of evident and less apparent manifestations will yield durable, representative heritage records that can serve as information cultural resource documents for public purposes."

Pictures of the site and a site map are enclosed.

Sincerely,

Bob

Robert E. Carroll
Vice President and General Manager

REC:lh
Enclosures